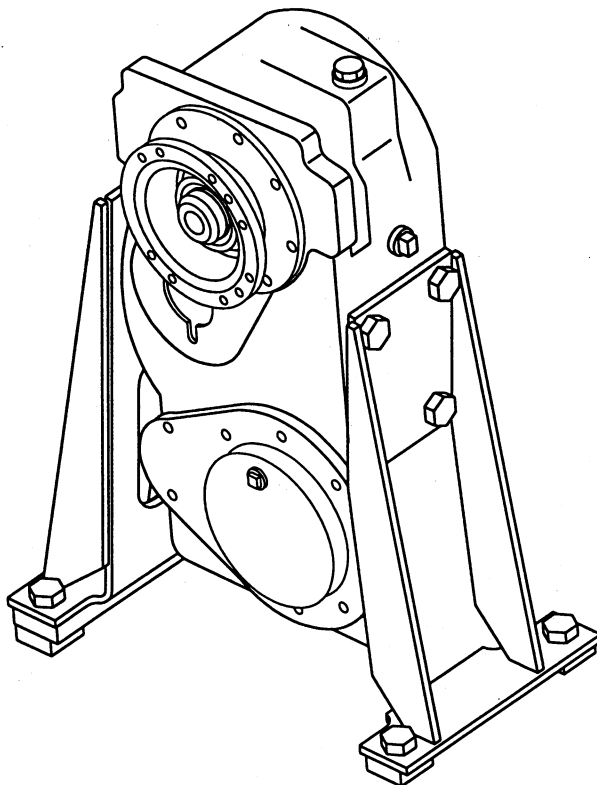


TECHNICAL MANUAL

UNIT, DIRECT SUPPORT AND GENERAL SUPPORT  
MAINTENANCE MANUAL

**TRANSFER CASE  
MODEL 738AN4NL4F**



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**DISTRIBUTION STATEMENT A:** Approved for public release; distribution is unlimited.

**HEADQUARTERS, DEPARTMENT OF THE ARMY**

**29 AUGUST 1997**



TECHNICAL MANUAL  
NO. 55-1945-205-24-4

HEADQUARTERS  
DEPARTMENT OF THE ARMY  
WASHINGTON D.C., 29 AUGUST 1997

**Unit, Direct Support, and General Support Maintenance Manual**

**TRANSFER CASE  
MODEL 738AN4NL4F**

**REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS**

You can help improve this manual. If you find any mistakes, or if you know of a way to improve these procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual directly to: Commander, US Army Tank-Automotive and Armaments Command, ATTN: AMSTA-AC-NML, Rock Island, IL 61299-7630. A reply will be furnished directly to you.

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## CHAPTER 1

## INTRODUCTION

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## OVERVIEW

This chapter contains general information pertaining to the Transfer Case.

## Section I. GENERAL INFORMATION

**1-1 SCOPE.** This manual contains instructions for Unit, Direct Support, and General Support Maintenance levels for the Transfer Case, model number 738AN4NL4F.

**1-2 SAFETY PRECAUTIONS.** Safety notices and instructions are found within the body of the maintenance instructions.

**1-3 MAINTENANCE FORMS AND RECORDS.** Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-750 as contained in the Maintenance Management Update.

**1-4 DESTRUCTION OF ARMY MATERIAL TO PREVENT ENEMY USE.** Procedures for destruction of Army material to prevent enemy use are contained in TM 750-244-6.

**1-5 REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIRs).** If your MCF system needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell what you don't like about your equipment, design or performance. Put it on a SF 368 (Product Quality Deficiency Report) Mail it to us at: Commander, U.S. Army ATCOM, ATTN: AMSAT-I-WTT, 4300 Goodfellow Blvd., St. Louis, MO, 63120-1798.

**1-6 WARRANTY INFORMATION.** The Modular Causeway Ferry (MCF) is warranted for eight months upon delivery. The warranty starts on the date found in block 23, DA Form 2408-9 in the logbook. Report all defects in material and workmanship to your supervisor, who will take appropriate action.

## Section II. EQUIPMENT DESCRIPTION AND DATA

**1-9 EQUIPMENT CHARACTERISTICS, CAPABILITIES AND FEATURES.** Detailed descriptions, engineering data, and tabulated data are found in Transfer Cases Maintenance Manual, pages 1 through 7.

**1-10 SPARE/REPAIR PARTS.** The spare and repair parts for the transfer case are found in TM 55-1945-205-24P, Unit Level, Direct Support and General Support Repair Parts and Special Tools List (RPSTL).



## CHAPTER 2

### MAINTENANCE INSTRUCTIONS

Section I.	GENERAL
Section II.	DISASSEMBLY
Section III.	REASSEMBLY



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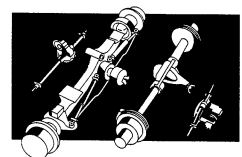


OFF-HIGHWAY AXLE



*People Finding A Better Way™*

S P I C E R



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## IMPORTANT SAFETY NOTICE

Proper service and repair is important to the safe, reliable operation of all motor vehicles. The service procedures recommended and described in this maintenance manual are effective methods for performing service operations. Some of these service operations require the use of tools specially designed for the purpose. The special tool should be used when and as recommended.

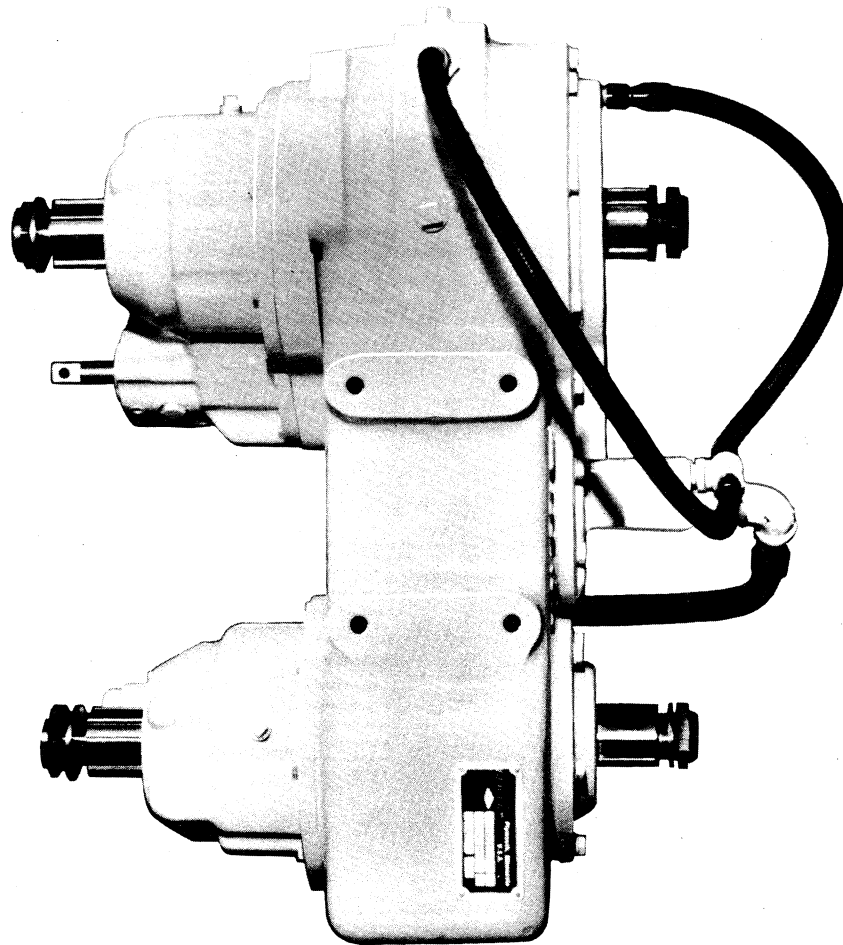
It is impossible to know, evaluate, and advise the service trade of all conceivable ways in which service might be done or of the possible hazardous consequences of each way.

Accordingly, anyone who uses a service procedure or tool which is not recommended, must first satisfy himself thoroughly that neither his safety nor vehicle safety will be jeopardized by the service methods he selects. The procedures described in this manual will consider the transfer case removed from the vehicle. Consult the Original Equipment Manufacturers recommendations and procedures for proper removal and installation.

Should a transfer case require component parts replacement, it is recommended that "original equipment" replacement parts be used. They may be obtained through your local service dealer or other original equipment manufacturer parts supplier. The use of non-original equipment replacement parts is not recommended as their use may cause unit failure and/or effect vehicle safety.

# SPICER®





## TRANSFER CASE

On sand, ice, snow, mud or severe grades, there is nothing like all-wheel drive to take you through really tough terrain. With the Spicer transfer case, you can take your big trucks where the work is, simply by pulling a lever and engaging the front wheel drive. You don't have to bring the work out to the trucks...take the trucks to the work.

The Spicer transfer case should be standard equipment on most "all-purpose" vehicles such as lumber fleets, snow plow vehicles and oil field hauling because it delivers maximum power on all transmission speeds.

The Spicer transfer case can be coupled directly to a Spicer auxiliary transmission. It provides full torque capacity to both front and rear axles.

Conventionally geared in a 1 to 1 ratio, with no reduction, the unit features spur gears throughout. An optional front wheel disconnect is available to allow disengagement when all-wheel drive is not required. The disconnect is available in manual or air both supplied with an electrical indicator switch.

# **SPICER®**



Ball bearing mounted gears and shafts prevent premature malfunctions.

Available with customer specified end yokes or companion flanges.

One piece construction provides rigidity necessary to withstand off highway usage.

Available with forced lubrication provisions.

Versatile design offers many configurations for customer requirements.

Constant mesh gears assure long life.

Customer can specify two different shift operations - air or manual

Available with integral Spicer Auxiliary transmissions.

Drop Gear  
Ratio - 1:1  
Weight - 450 Lbs. Dry  
Continuous Duty Torque Rating — 3725 lb-ft.  
Manual Transmission Low Gear Net Torque Rating (Based on 85% Efficiency) — 10,000 lb-ft.  
Automatic Transmission Stall Torque Rating = 11,000 lb-ft. (Stall Torque Value to be taken from Engine-Transmission Performance Curve).  
Maximum Operating Speed = 5000 RPM

The maximum torque at the transfer case can be limited by either the engine capacity or the vehicle wheel skid. All applications must be approved by our Engineering Department.

---

## MODEL NUMBER CONSTRUCTION TABLE

---

The disconnect requires air to both engage and disengage the output. A detent is added on the shifter spool to maintain position if air supply is lost. There is also a manual shift option available for this design with an indicator light switch being standard on both. The line drawing (on page 6) illustrates both options in detail.

The control inside the cab will need to be a 4-way valve so that air can be supplied to either side of the piston in the disconnect. The indicator light switch needs to be wired from the battery (or another source) to one terminal and also to a light in the cab. The light should be in the "ON" position when the disconnect is engaged. Air pressure to shift is 80 PSI minimum while the manual requires a pull of 125 lbs. at the spool end.

The air shift will be designated with an "E" while the manual will be "M" in the model number. With this new design, even the rear axle output disconnect can now be air shifted without adapting an air cylinder to the manual shift. The shifter option for the rear axle output will come after the lower rear output flange position in the model number.

The only modifications needed for the disconnect will be the cab air control for shifting the air disconnect, or the linkage for shifting the manual disconnect.

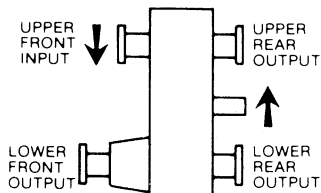
Regardless of the model number, units with disconnects on the side opposite the lube pump or lube pump mounting surface, use the following conversion kits:

420504X	Air shift with indicator switch
420505X	Manual with indicator switch

Units with disconnects on the same side as the lube pumps use the conversion kits listed below:

420506X	Air shift with indicator switch
420507X	Manual with indicator switch

## 738 TRANSFER CASE MODEL NUMBER CONSTRUCTION TABLE



### Model 738

Model Description	Speedometer Gear Sets	
	Drive Gear	Driven Gear
A Remote Mount (No speedo avail.)	—	—
B Direct Mount W/speedo	70-452-5 (3T)	70-453-2 (12T)
C Direct Mount W/speedo	70-452-6 (4T)	70-453-4 (12T)
D Direct Mount W/speedo	70-452-8 (3T)	70-453-1 (14T)
E Direct Mount without speedo	▲	—

▲ - Use 70-452-8 as spacer

No Symbol —  
Less Trunion  
T = Trunion available  
with 738B, C, D, & E only

Basic Model

Upper Rear Output  
\*See flange listing opposite page  
0 thru 9, N, P, X, Y

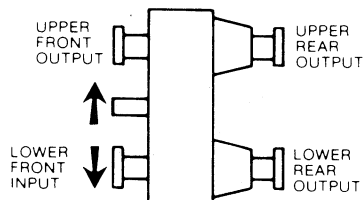
Forced Lube = F, CW  
Forced Lube = G, CCW  
Splash Lube = S

Upper Front Input  
\*See flange listing opposite page  
0 thru 9, N, P, X, Y

Lower Front Output  
Shifter options  
M = Manual shift with indicator switch  
E = Air shift with indicator switch  
L = Less shifter

Lower Front Output  
\*See flange listing opposite page  
0 thru 9, N, P, X, Y

Lower Rear Output  
\*See flange listing opposite page  
0 thru 9, N, P, X, Y



### Model 784

Basic Model

Upper Rear Output  
\*See flange listing opposite page  
0 thru 9, N, P, X, Y

Upper Rear Output  
Shifter options  
M = Manual shift with indicator switch  
E = Air shift with indicator switch

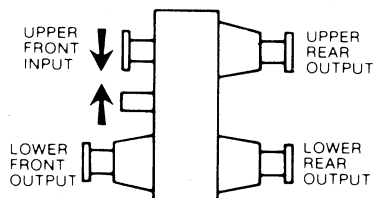
Lower Rear Output  
\*See flange listing opposite page  
0 thru 9, N, P, X, Y

Forced Lube = F, CW  
Forced Lube = G, CCW

Upper Front Output  
\*See flange listing opposite page  
0 thru 9, N, P, X, Y

Lower Front Input  
\*See flange listing opposite page  
0 thru 9, N, P, X, Y

Lower Rear Output  
Shifter options  
M = Manual shift with indicator switch  
E = Air shift with indicator switch



### Model 785

Basic Model

Upper Rear Output  
\*See flange listing opposite page  
0 thru 9, P, X, Y

Upper Rear Output  
Shifter options  
M = Manual shift with indicator switch  
E = Air shift with indicator switch

Lower Rear Output  
\*See flange listing opposite page  
0 thru 9, P, X, Y

Lower Rear Output  
Shifter options  
M = Manual shift with switch  
E = Air shift with switch

Forced Lube = F, CW  
Forced Lube = G, CCW

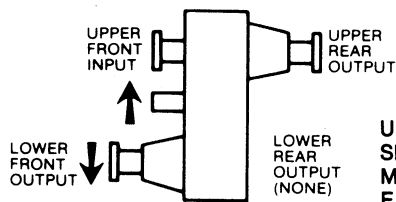
Upper Front Input  
\*See flange listing opposite page  
0 thru 9, N, P, X, Y

Lower Front Output  
Shifter options  
M = Manual shift with indicator switch  
E = Air shift with indicator switch

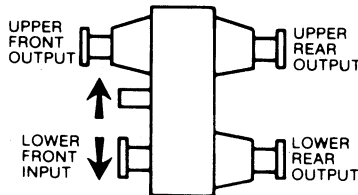
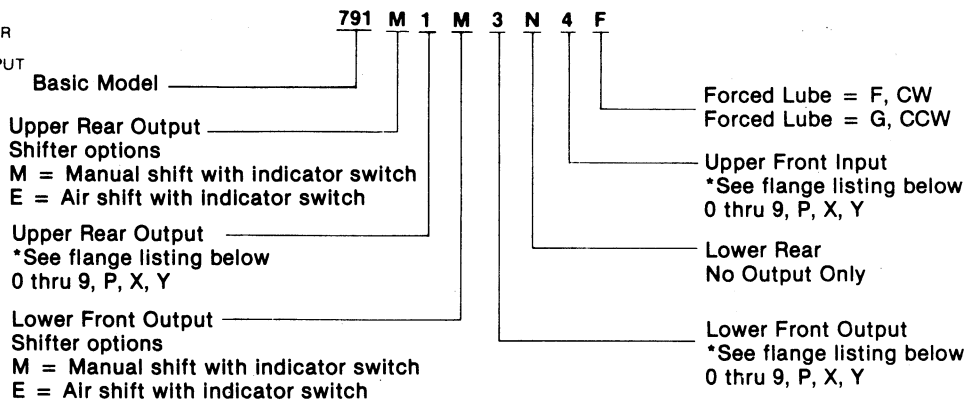
Lower Front Output  
\*See flange listing opposite page  
0 thru 9, P, X, Y

# 738 TRANSFER CASE MODEL NUMBER CONSTRUCTION TABLE

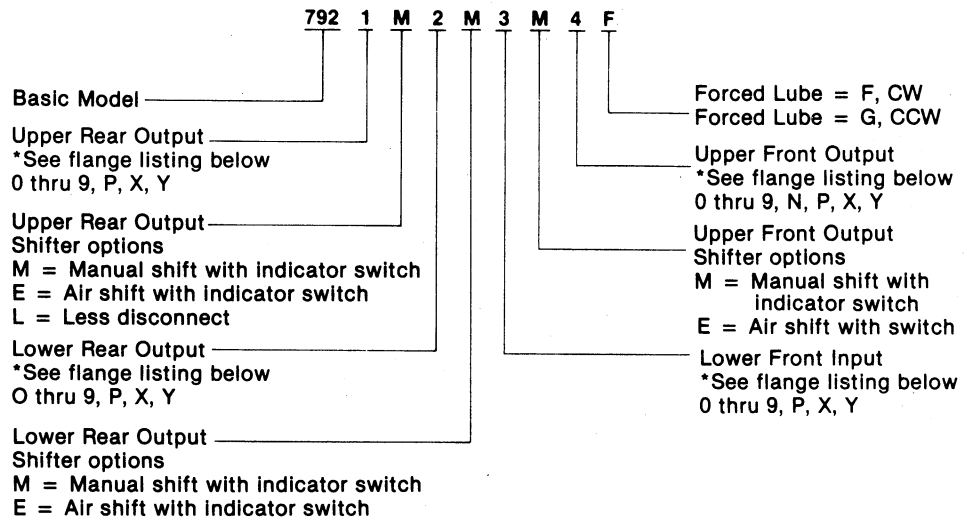
**Spicer®**



## Model 791



## Model 792



↑ Direction of rotation must be determined for proper pump selection.  
↓

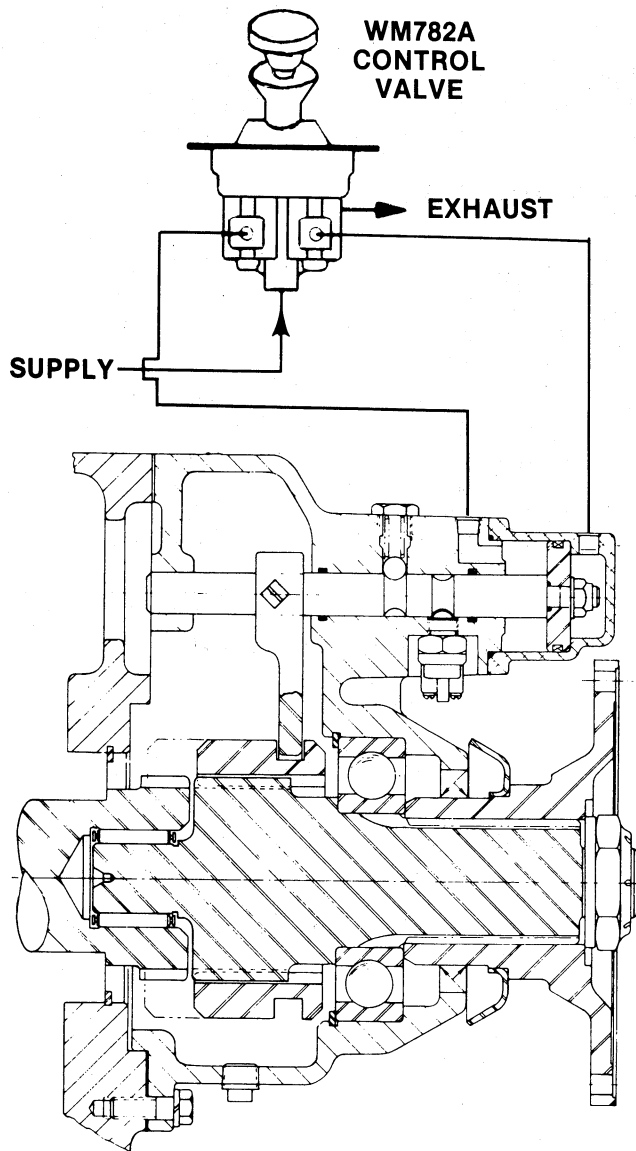
Note: F = H378889-1 Clockwise Rotation Input Pump  
G = H378853-1 Counter Clockwise Rotation Input Pump

## \*FLANGE and END YOKE LISTING

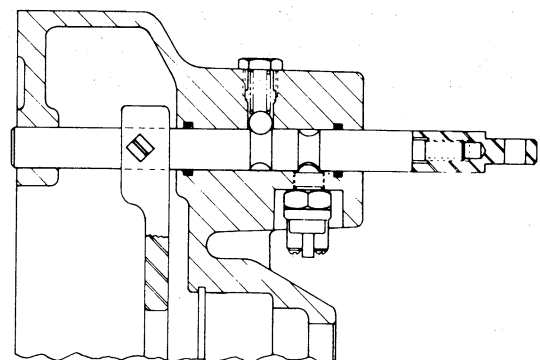
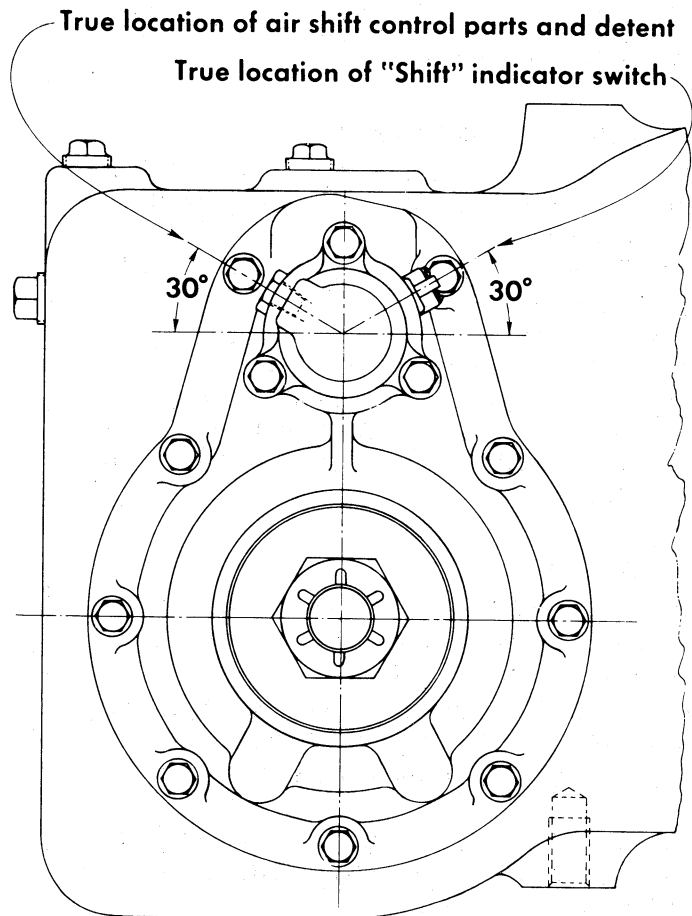
O = 5-1-2541, 1610 Series Flange  
1 = 5-1-4641X, 1610 Series Flange with Slinger  
2 = 6-1-1731, 1710 Series Flange  
3 = 6-1-4091X, 1710 Series Flange with Slinger  
4 = 6.5-1-481, 1810 Series Flange  
5 = 6.5-1-1471X, 1810 Series Flange with Slinger  
6 = 6-4-3031, 1710 End Yoke  
7 = 6-4-3461X, 1710 End Yoke with Slinger  
8 = 6.5-4-1971, 1810 End Yoke  
9 = 6.5-4-2831X, 1810 End Yoke with Slinger

N = No output (Blanked off)  
P = No flange, output (Paper sleeve)  
X = 5-4-4751X, 1610 End Yoke with Slinger  
Y = 6-1-1481, 1710 Series Flange

# DISCONNECTS FOR SPICER HEAVY-DUTY TRANSFER CASES



AIR SHIFT W/INDICATOR SWITCH



MANUAL SHIFT W/INDICATOR SWITCH

# LUBRICATION

To insure proper lubrication and operating temperatures in these units, it is most important that the specified lubricants be used and that correct oil levels be maintained.

## RECOMMENDED LUBRICANTS

The lubricants listed below are recommended in order of preference for use in all Spicer mechanical transfer cases.

**DO NOT USE EXTREME PRESSURE ADDITIVES** such as found in multipurpose or rear axle type lubricants. These additives are not required in Spicer transfer cases. Multipurpose oils, as a group, have relatively poor oxidation stability, a high rate of sludge formation, and a greater tendency to react on or corrode the steel and bronze parts.

## OIL CHANGES

Over-The-Road Service: Initial flush and oil change after 1000 miles of service, but not to exceed 4000 miles of service.

Scheduled flush and oil change every 20,000 miles of service after initial oil change.

Check oil level every 2000 miles of service.

Off-The-Road Service: Initial flush and oil change after 24 hours of service, but not to exceed 100 hours of service.

Scheduled flush and oil change every 30 days after initial oil change.

Check oil every 24 hours of service.

Prolonged Low RPM or Stationary Operation: For cases of prolonged low RPM (below 1000 RPM input to transfer case) or prolonged stationary operation, a lube pump is recommended. These lube pumps are available on all models of the Spicer Heavy Duty Transfer Cases.

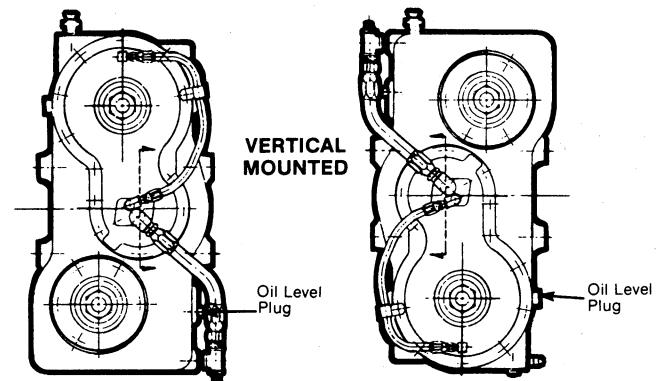
## REFILL

First, remove all dirt around the filler plug. Then refill with new oil of grade recommended for the existing season and prevailing service. Fill to the bottom of the plug hole on the side or front of transfer case, depending on mounting (see illustration below).

## OVERFILLING

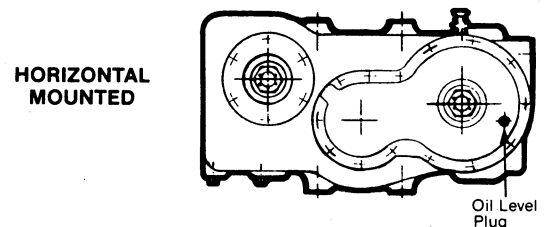
Do not overfill the transfer case. Overfilling usually results in oil breakdown due to excessive heat and aeration from the churning action of the gears. Early breakdown of the oil will result in heavy varnish and sludge deposits that plug up oil ports and build up on splines and bearings.

## LUBRICANT LEVEL



Oil level plugs in line with lower shaft

Oil Capacity —  
11 Pints Approx.



## TEMPERATURE

Above 0° F.  
Below 0° F.

## GRADE

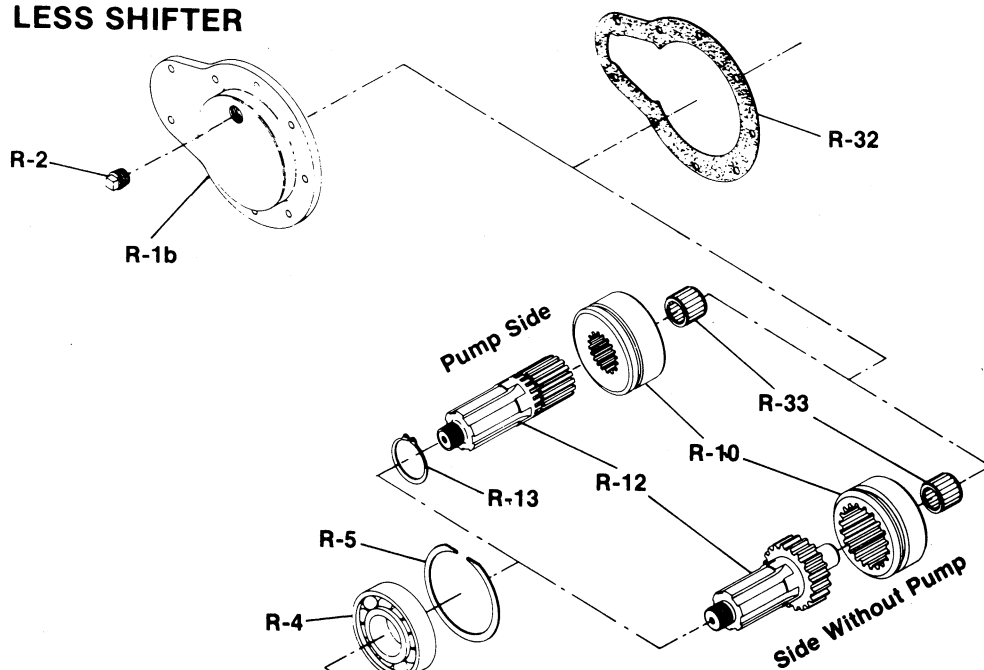
SAE 50  
SAE 30  
  
SAE 90  
SAE 80

## TYPE

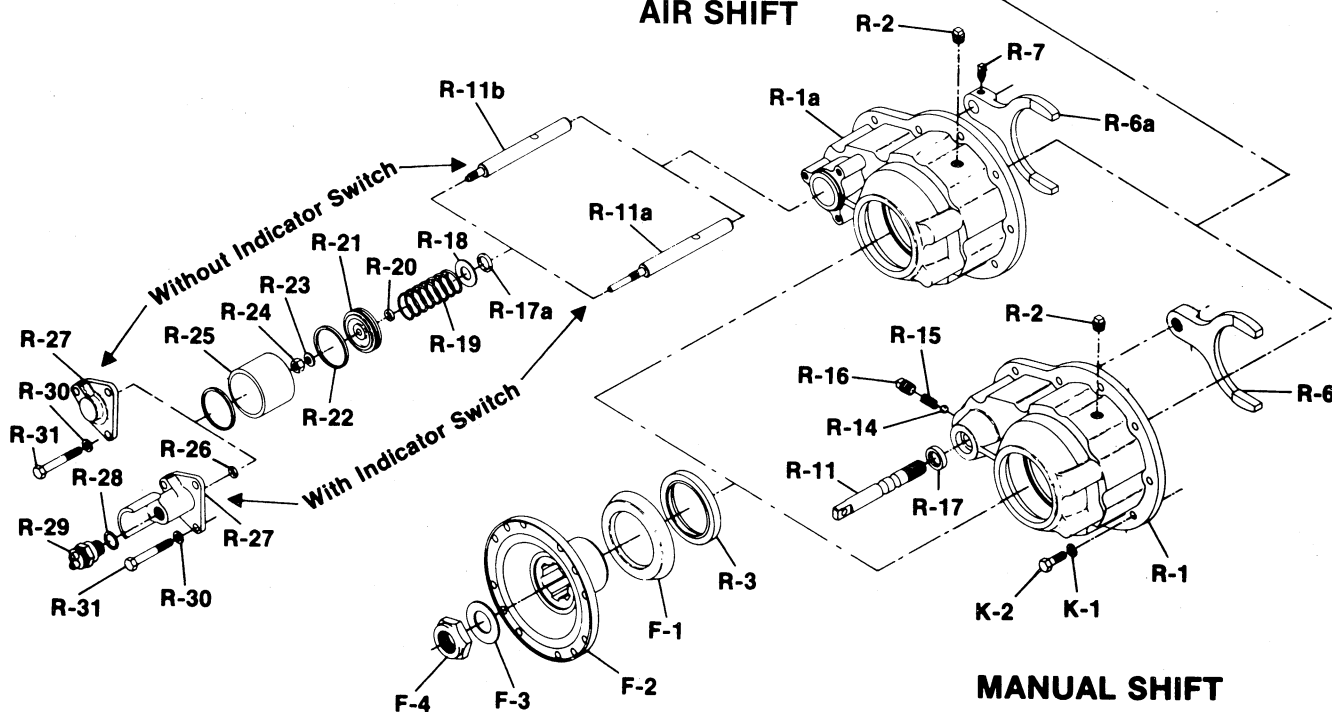
Heavy Duty Engine Oil Meeting MIL-L-2104F or MIL-L-46152  
NOTE: Oils Meeting MIL-L-2104B or MIL-L-45199 Are Also Acceptable  
Straight Mineral Gear Oil — R & O Type

(SEE PAGE 10 FOR LATER DESIGN)

### LESS SHIFTER



### AIR SHIFT



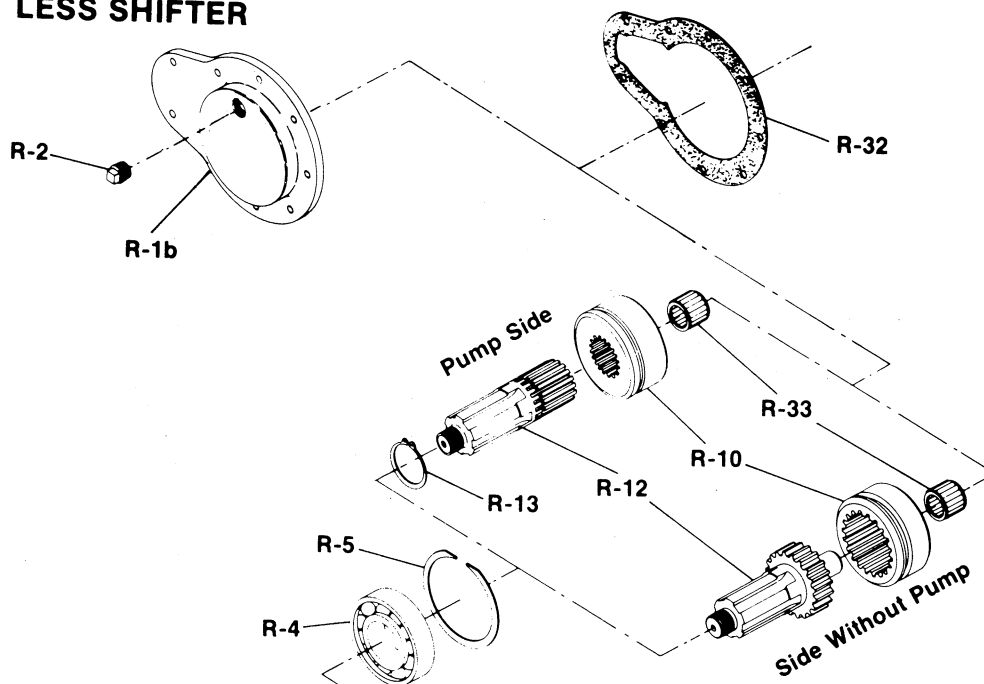
### MANUAL SHIFT

Ref. No.	Part Description
R-1	Cap—disconnect housing & bearing (manual)
R-1a	Cap—disconnect housing & bearing (air)
R-1b	Cap—disconnect housing & bearing (less shifter)
R-2	Plug—disconnect cap
R-3	Oil Seal—output shaft
R-4	Bearing—ball
R-5	Snap Ring
R-6	Shifter Fork—manual
R-6a	Shifter Fork—air
R-7	Bolt— $\frac{3}{8}$ "-24 x 2" - self locking
R-10	Clutch Collar—disconnect sliding
R-11	Shifter Rod—manual
R-11a	Shifter Rod—air (with indicator switch)
R-11b	Shifter Rod—air (without indicator switch)
R-12	Disconnect Shaft
R-13	Snap Ring
R-14	Ball—poppet
R-15	Spring—poppet ball
R-16	Plug—poppet ball $\frac{5}{8}$ "-18 UNF
R-17	Seal—shifter rod
R-17a	"O" Ring
R-18	Washer—return spring retainer
R-19	Spring—return
R-20	"O" Ring—piston
R-21	Piston—air shift
R-22	"O" Ring—piston
R-23	Washer—shifter rod
R-24	Nut— $\frac{3}{8}$ "-24
R-25	Cylinder—air shift
R-26	"O" Ring—cylinder cap (with indicator switch)
R-27	Cylinder Cap—(with indicator switch)
R-27	Cylinder Cap—(without indicator switch)
R-28	Gasket Assembly—indicator switch
R-29	Indicator Switch Assembly
R-30	Lockwasher— $\frac{3}{8}$ "
R-31	Bolt— $\frac{3}{8}$ "-16 x 3" hex head
F-3	Washer
F-4	Nut—self locking
R-32	Gasket—bearing & disconnect cap
<b>NOTE: PARTS LISTED ARE NOT PART OF ASSEMBLIES</b>	
K-1	Lockwasher— $\frac{3}{8}$ "
K-2	Bolt— $\frac{3}{8}$ "-16 x 1 $\frac{1}{4}$ " hex head
F-1	Slinger
F-2	Companion Flange or End Yoke
R-33	Bearing—disconnect roller

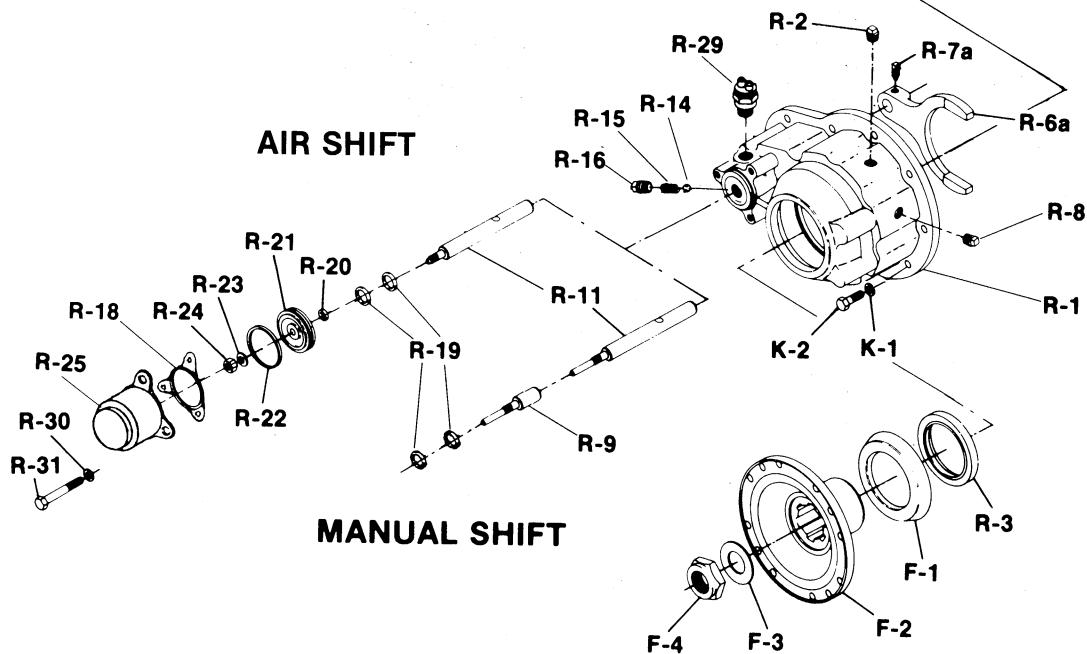
## LATE DESIGN OUTPUT with DISCONNECT

(SEE PAGE 8 FOR EARLIER DESIGN)

### LESS SHIFTER



### AIR SHIFT

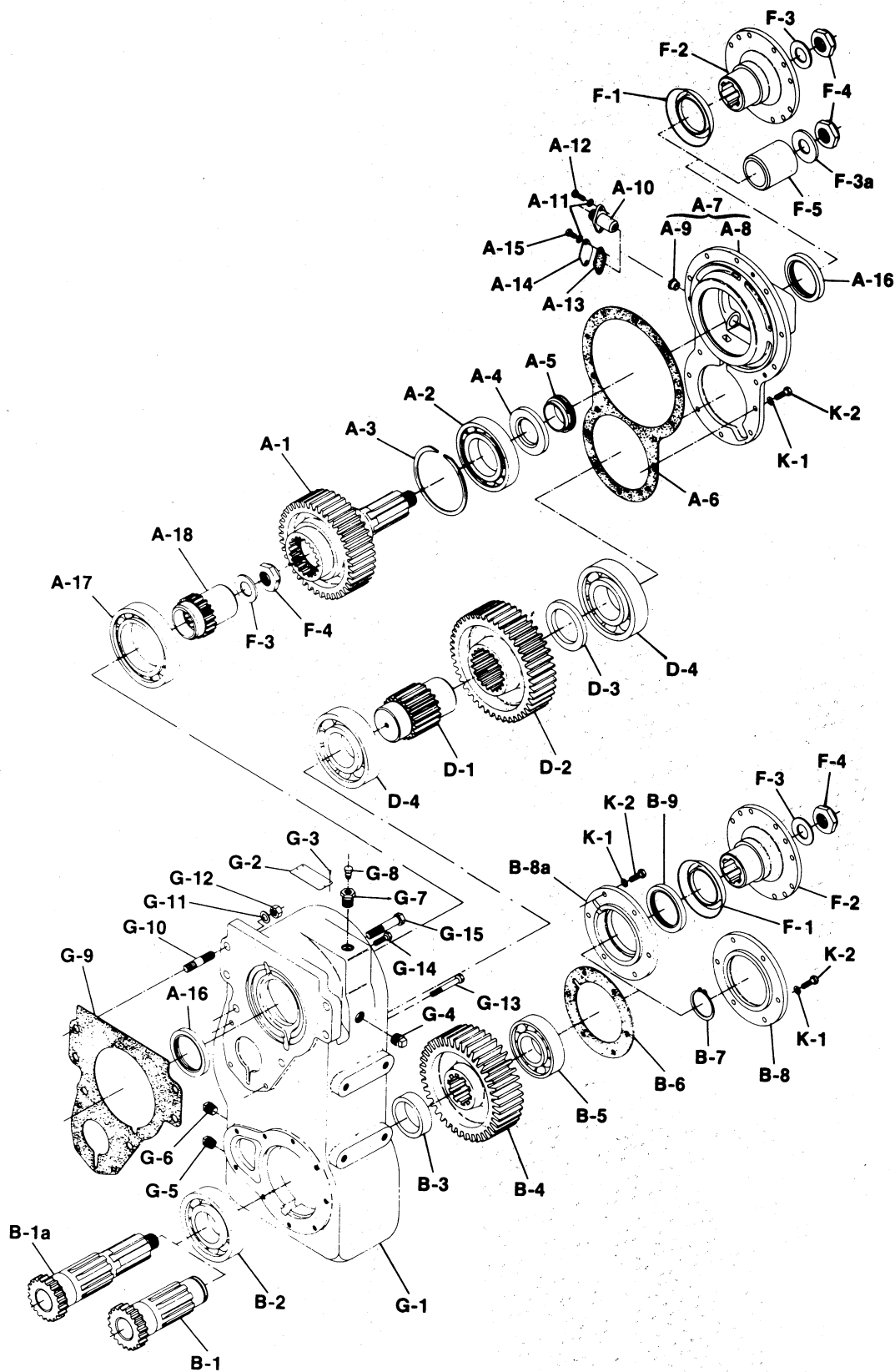


### MANUAL SHIFT

# LATE DESIGN OUTPUT with DISCONNECT

Ref. No.	Part Description
R-1	Cap—disconnect housing & bearing
R-1b	Cap—disconnect housing & bearing (less shifter)
R-2	Plug—disconnect cap
R-3	Oil Seal—output shaft
R-4	Bearing Ball
R-5	Snap Ring
R-6a	Shifter Fork
R-7a	Bolt $\frac{3}{8}$ " - 24 x $\frac{9}{16}$ -self locking
R-8	Plug—Pipe $\frac{1}{2}$ -14
R-9	Clevis—manual shift
R-10	Clutch Collar—disconnect sliding
R-11	Shifter Rod
R-12	Disconnect Shaft
R-13	Snap Ring
R-14	Ball—poppet
R-15	Spring—poppet ball
R-16	Plug—poppet ball $\frac{5}{8}$ -18 UNF
R-18	Gasket—oil seal
R-19	"O" Ring Seal
R-20	"O" Ring Seal
R-21	Piston—air shaft
R-22	"O" Ring—piston
R-23	Washer—shifter rod
R-24	Nut— $\frac{3}{8}$ "-24
R-25	Cap—shift cylinder
N.S.	Plug—shipping
R-29	Indicator Switch Assembly
R-30	Lockwasher— $\frac{3}{8}$ "
R-31	Bolt— $\frac{3}{8}$ "-16x3" hex head
F-3	Washer
F-4	Nut—self locking
R-33	Bearing—disconnect roller
<b>NOTE: PARTS LISTED ARE NOT PART OF ASSEMBLIES</b>	
K-1	Lockwasher— $\frac{3}{8}$ "
K-2	Bolt— $\frac{3}{8}$ "-16x1 $\frac{1}{4}$ " hex head
F-1	Slinger
F-2	Companion Flange or End Yoke
R-32	Gasket—bearing & disconnect cap

## TRANSFER CASE DIRECT MOUNT CASE and GEARS

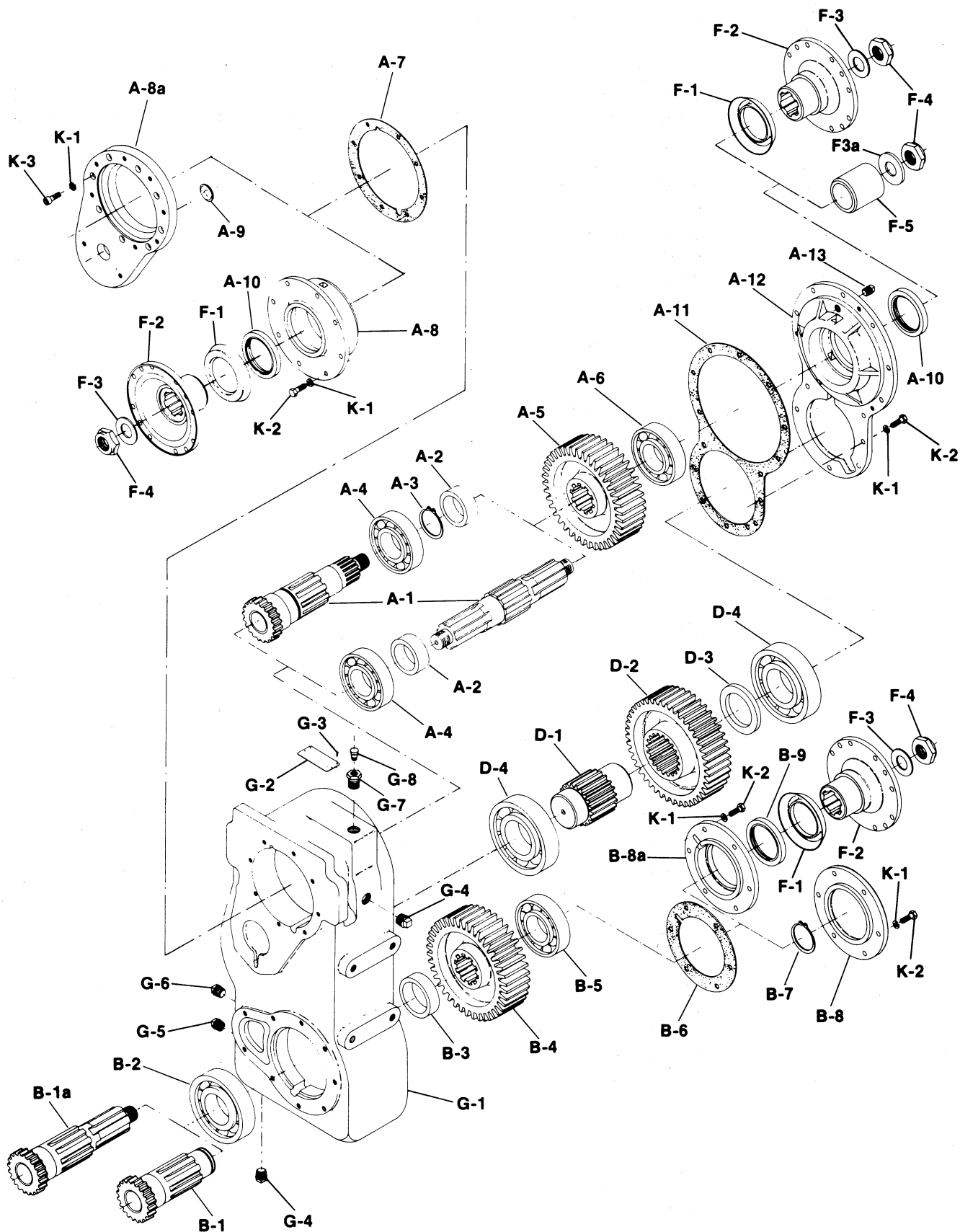


# TRANSFER CASE DIRECT MOUNT CASE and GEARS

**Spicer®**

Ref. No.	Part Description
A-1	Gear and Shaft—input
A-2	Bearing—input
A-3	Snap Ring
A-4	Spacer—input
A-5	Speedometer Gear Set
A-6	Gasket—bearing cap
A-7	Bearing Cap & Speedometer Bushing Assembly
A-8	Bearing Cap
A-9	Bushing—speedometer
A-10	Sleeve—speedometer
A-11	Lockwasher— $\frac{5}{16}$ "
A-12	Bolt— $\frac{5}{16}$ "-18 x $\frac{7}{8}$ "
A-13	Gasket—speedometer cover
A-14	Cover—speedometer
A-15	Bolt— $\frac{5}{16}$ "-18 x $\frac{5}{8}$ "
A-16	Oil Seal
A-17	Bearing—input
A-18	Coupler—input shaft
B-1	Shaft—closed end
B-1a	Shaft—with output
B-2	Bearing—ball
B-3	Spacer—output shaft
B-4	Gear—output shaft (40T)
B-5	Bearing—ball
B-6	Gasket
B-7	Snap Ring
B-8	Bearing Cap—closed end
B-8a	Bearing Cap—with output shaft
B-9	Oil Seal
D-1	Shaft—intermediate
D-2	Gear—intermediate
D-3	Spacer—intermediate
D-4	Bearing—intermediate
F-1	Slinger
F-2	Companion Flange or End Yoke
F-3	Flat Washer—with Flange or End Yoke
F-3a	Flat Washer—with spacer
F-4	Nut— $1\frac{1}{4}$ "-18" self locking
F-5	Spacer—without Flange or End Yoke
G-1	Case—direct mount
G-2	Nameplate
G-3	Pin-nameplate
G-4	Plug—breather hole
G-5	Plug—magnetic drain $\frac{1}{2}$ -14 N.P.T.F.
G-6	Plug—Filler
G-7	Reducer Bushing—breather
G-8	Breather
G-9	Gasket—mounting
G-10	Stud— $\frac{5}{8}$ "-11 & $\frac{5}{8}$ "-18 x $2\frac{7}{8}$ "
G-11	Lockwasher
G-12	Nut— $\frac{5}{8}$ "-18
G-13	Bolt— $\frac{3}{8}$ "-16 x $1\frac{1}{4}$ " self locking
G-14	Bolt— $\frac{5}{8}$ "-11 x $3\frac{1}{4}$ " self locking
G-15	Bolt— $\frac{3}{8}$ "-16 x $2\frac{3}{4}$ " self locking
K-1	Lock Washer— $\frac{3}{8}$ "
K-2	Bolt— $\frac{3}{8}$ "-16 x $1\frac{1}{4}$ " hex head

## TRANSFER CASE REMOTE MOUNT CASE and GEARS

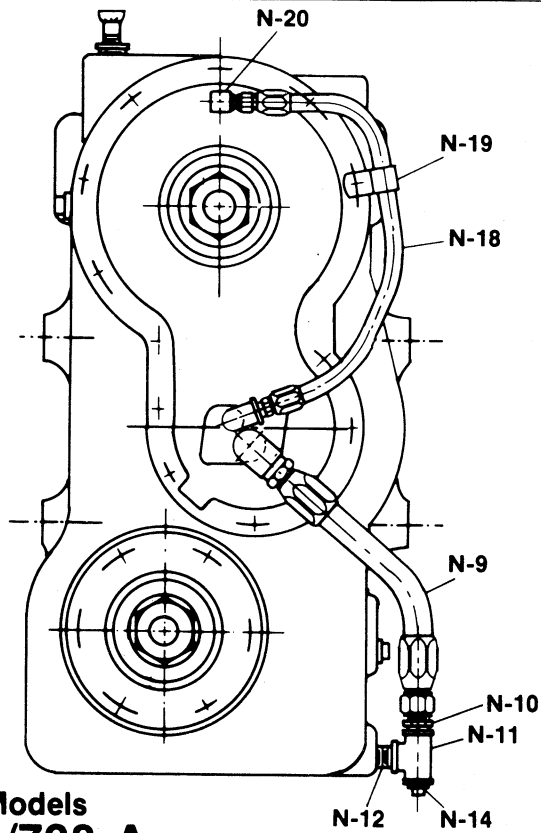


# TRANSFER CASE

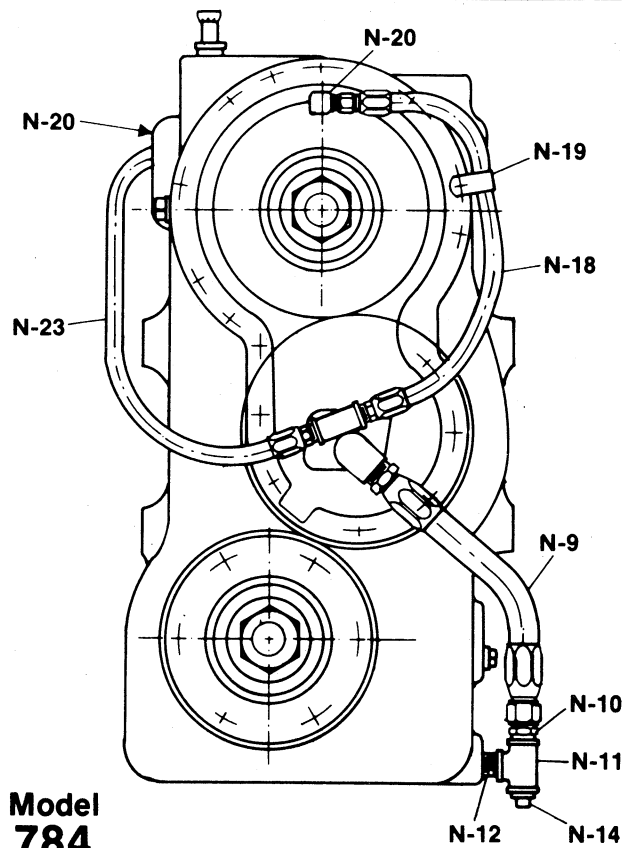
## REMOTE MOUNT CASE and GEARS

Ref. No.	Part Description		
A-1	Input Shaft	N.S.	Plug-breather hole horizontal mount
A-2	Input Shaft Spacer	N.S.	90° Street Elbow—horizontal mount
A-3	Snap Ring	N.S.	Breather—horizontal mount (G-8)
A-4	Bearing Input Shaft		
A-5	Gear Input Shaft		
A-6	Bearing Input Shaft		
A-7	Gasket		
A-8	Cap-Bearing		
A-8a	Adapter		
A-9	Expansion Ring		
A-10	Oil Seal		
A-11	Gasket		
A-12	Bearing Cap		
A-13	Oil Level Plug—horizontal mount		
B-1	Shaft—closed end		
B-1a	Shaft-with output		
B-2	Bearing Output Shaft		
B-3	Spacer Output Shaft		
B-4	Gear Output Shaft		
B-5	Bearing Output Shaft		
B-6	Gasket		
B-7	Snap Ring		
B-8	Bearing Cap—without output shaft		
B-8a	Bearing Cap—with output shaft		
B-9	Oil Seal		
D-1	Shaft Intermediate		
D-2	Gear Intermediate Shaft		
D-3	Spacer Intermediate Shaft		
D-4	Bearing Intermediate Shaft		
F-1	Slinger		
F-2	Companion Flange		
F-3	Flat Washer—with flange or end yoke		
F-3a	Flat Washer		
F-4	Nut		
F-5	Spacer		
G-1	Case Remote Mount		
G-2	Name Plate		
G-3	Pin—name plate		
G-4	Plug Breather Hole		
G-5	Plug Magnetic Drain		
G-6	Plug Filler		
G-7	Reducer Bushing—breather		
G-8	Breather		
K-1	Lockwasher		
K-2	Bolt—hex head		
K-3	Bolt—socket head		

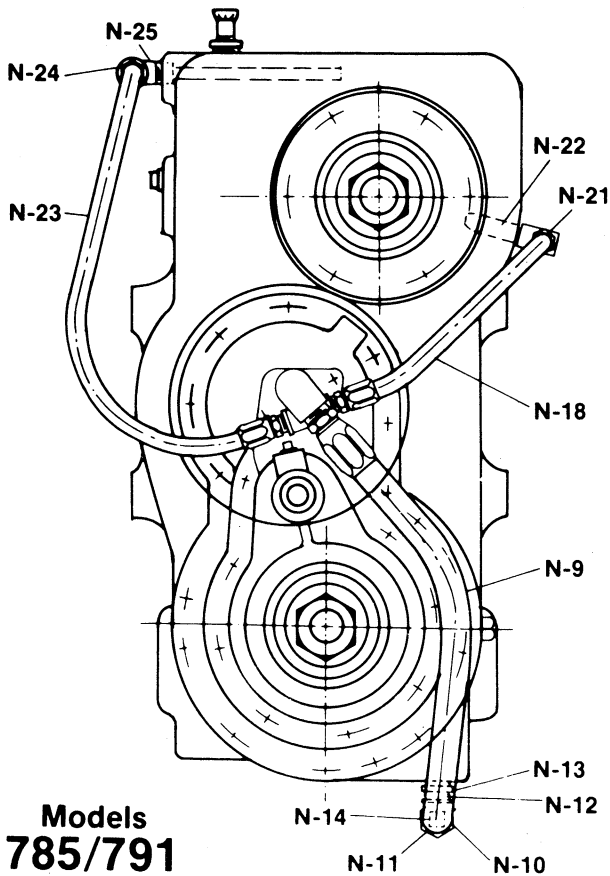
N.S.—Not Shown



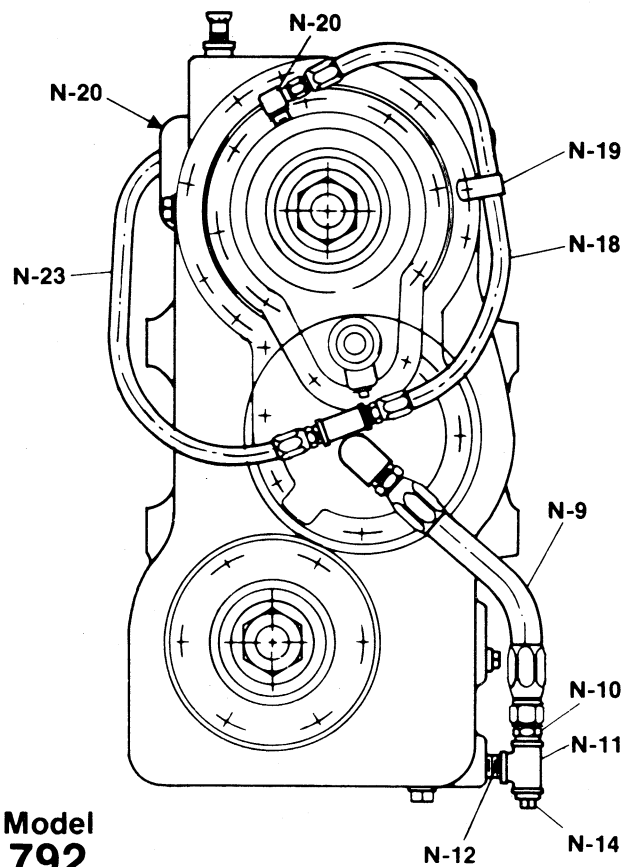
**Models  
738/738-A**



**Model  
784**



**Models  
785/791**

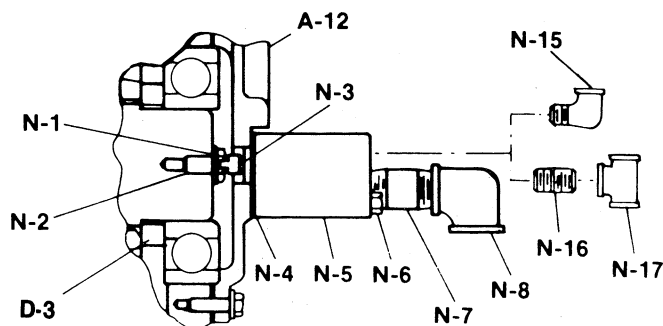


**Model  
792**

# TRANSFER CASE LUBE PUMP, HOSES and FITTINGS

**Spicer®**

Ref. No.	Part Description
A-12	Bearing Cap—lube pump
D-3	Spacer—intermediate shaft & bearing
N-1	Shim—drive screw (.010")—as required
N-1	Shim—drive screw (.050")—as required
N-2	Drive Screw—pump ½-13 x 1"
N-3	Coupling—drive screw to pump
N-4	Gasket—bearing cap to pump
N-5	Pump
N-6	Bolt—5/16"-18 x 3¾"
<b>INLET</b>	
N-7	Pipe Nipple—¾"-14 x 2½" (With inline filter)
N-8	90° Elbow—¾"-14 N.P.T.
N-9	Hose Assembly
N-10	Male Connector—½"-14 to 7/8"-14
N-11	Pipe Tee—½"-14
N-12	Pipe Nipple—½"-14 x 1½"
N-13	Reducer Bushing—¾"-14 to ½"-14
N-14	Drain Plug—magnetic ½-14 N.P.T.F.
<b>1st - OUTLET</b>	
N-15	90° Elbow—¾"-18 N.P.T.
N-16	Pipe Nipple—¾"-18 x 1" N.P.T.
N-17	Pipe Tee—¾"-18 N.P.T.
N-18	Hose Assembly
N-19	Support Clamp
N-20	90° Hose Adaptor—¾"-18 to 9/16"-18
N-21	Hose Adaptor—¾"-18 to 9/16"-18
N-22	Pipe Nipple—¾"-18
<b>2nd - OUTLET</b>	
N-23	Hose Assembly
N-24	Male Connector—½"-14 to 9/16"-18
N-25	Tube and Street Elbow Assembly



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# General Precautions for Disassembly

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## IMPORTANT

Read this section before starting the detailed disassembly procedure.

Follow each procedure closely in each section, making use of both the text and the pictures.

## REBUILD FACILITIES

A suitable holding fixture or overhaul stand is desirable but not necessary to rebuild this unit.

For easier working conditions, table height should be 28-30 inches. A light chain hoist should be used to handle the transfer case during disassembly and reassembly procedures.

## CLEANLINESS

The transfer case should be steam cleaned prior to disassembly. Seal all openings before steam cleaning to prevent entry of dirt and water which can damage serviceable parts.

Dirt is abrasive and will cause premature wear of bearings and other parts. We suggest that mechanics have a small wash tank to clean parts just prior to reassembly.

## BEARINGS

Bearings should be removed with pullers designed for this purpose. Wrap the bearings to keep out dirt. Clean, inspect, and lubricate all bearings just prior to reassembly. If accumulated mileage is over 150,000 miles we suggest that all bearings be replaced.

## END YOKES & FLANGES

Hammering on end yokes and flanges to remove or install them is not only destructive to the yoke or flange itself, but can also cause serious internal damage. Hammering destroys or mutilates the pilot diameters and warps or bends the flange. Hammering on end yokes will close-in the bearing bores or misalign yoke lugs and result in early failure of journal needle bearings, etc.

Serious damage can be done internally to bearings, thrust faces and washers, etc. by hammering on external parts.

In most designs, when the yoke/flange locknuts are tightened and secure, the internal bearings and gears are in proper location.

## CLEANING

1. Parts should be cleaned with emulsion cleaners or petroleum based cleaners.

**NOTE: Alkaline type solutions may cause damage to machined surfaces and should be avoided.**

2. Make sure interior of transfer case housing is clean prior to reassembly.
3. Clean all gasket surfaces of old material.

## DRYING

Use soft, clean, lintless towels or rags to dry components after cleaning. Bearings should NOT be dried by spinning with compressed air. This can damage mating surfaces due to lack of lubrication.

After drying, parts should be coated with a light coat of lubricant or rust preventive to prevent damage from corrosion. If parts are to be stored for a prolonged period, they should be wrapped in waxed paper.

## INSPECTION

Prior to reassembly, inspect parts for signs of wear or damage. Replacement of these parts can prevent premature failure and costly downtime.

Bearing surfaces should be inspected for pitting, wear, or overheating.

Inspect gears and clutches for wear or damage. Replace gears that are pitted, scored, or worn.

Inspect shafts for nicks or mars or damaged threads.

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**Safety Glasses should be worn at all times when assembling or disassembling.**

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## Preparation for Disassembly

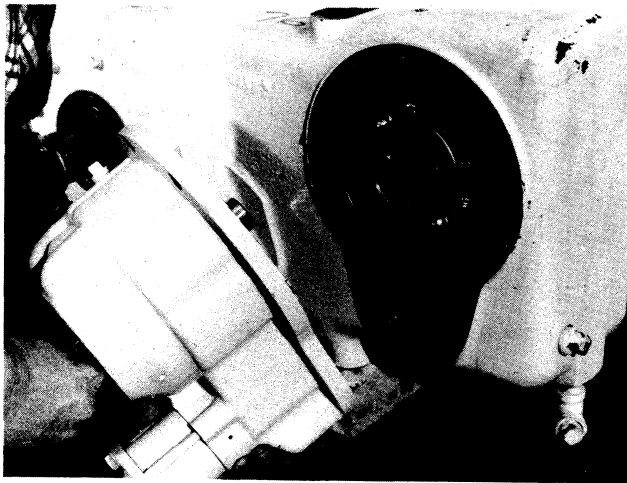
1. After removing transfer case from vehicle, clean exterior prior to disassembly. Care should be taken to prevent water from entering assembly.
2. Remove drain plug at bottom of case and drain lubricant.
3. A clean working area is essential. It is important to prevent foreign material from entering assembly during repairs.
4. Position transfer case in a suitable holding fixture or horizontally on table with upper front input and lower front output facing upward or forward.

## Removal of Shift Unit

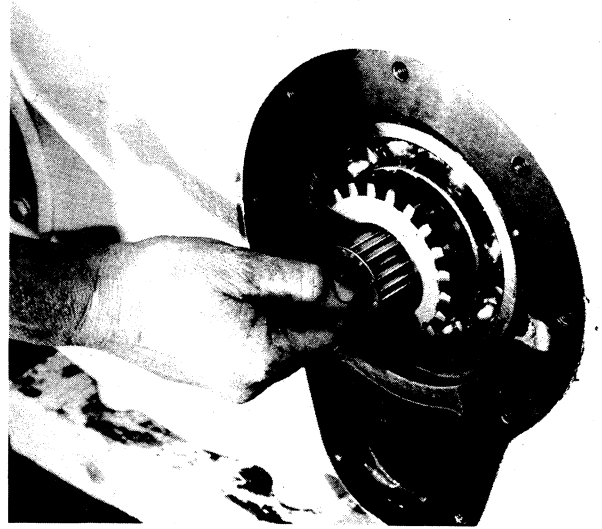
Depending on the model, the shift unit can be mounted on any one of the output shafts. The removal of each of the shift units will be the same, regardless of the position.

Remove air lines if required.

1. Remove lock nut and washer from output shaft. Remove end yoke or companion flange.
2. Disengage shift unit by pulling the shifter shaft up or out.



3. Remove nine (9) bolts and lock washers from flange of disconnect. Remove disconnect by lifting straight away from case. Remove gasket and discard.



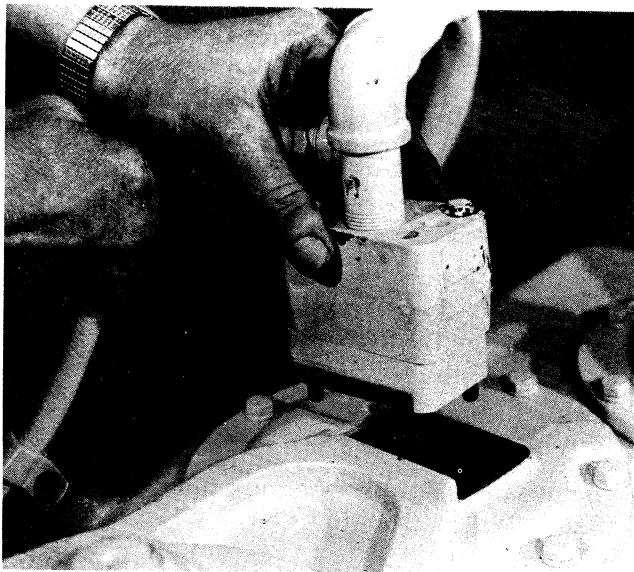
4. Remove needle roller bearing from output shaft.

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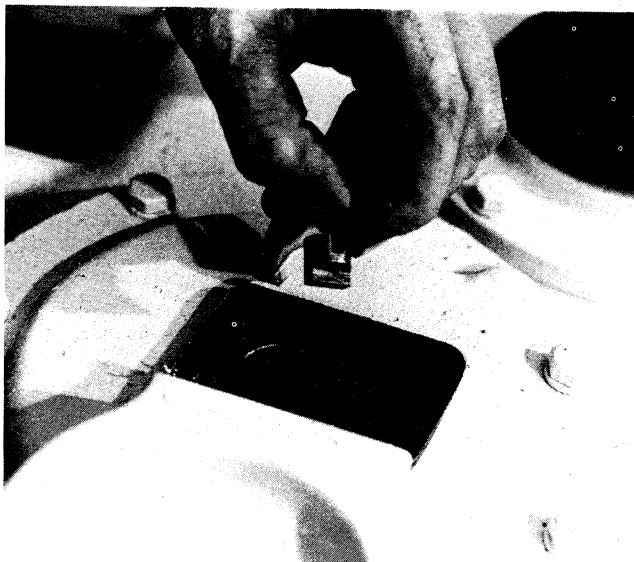
## LUBRICATION PUMP

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### Removal from Transfer Case



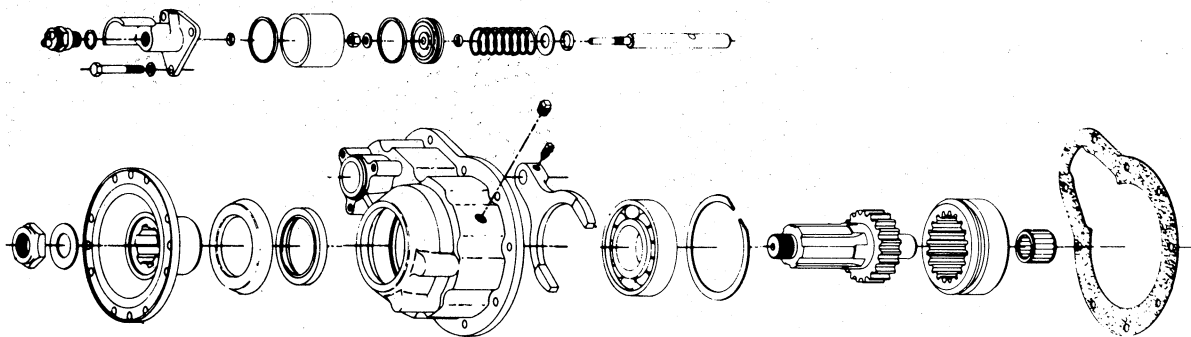
1. Disconnect lubricant hoses from transfer case. Remove two bolts holding lubrication pump and lift pump from housing. Remove old gaskets and discard.



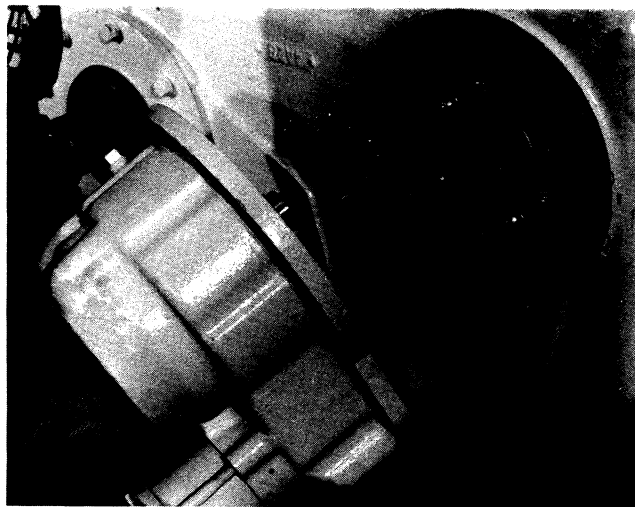
2. Remove drivescrew coupling from housing.

**NOTE:** Lubrication pump is a nonserviceable item. If pump malfunctions internally, it will need to be replaced.

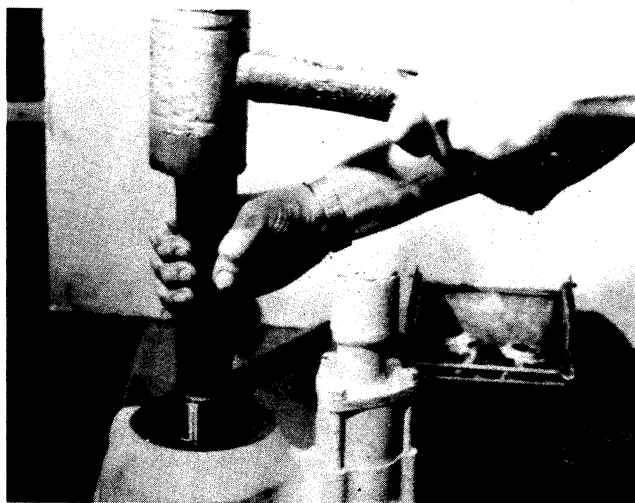
## Disassembly of Air Engaged—Spring Disengaged Shift Unit Early Design



1. Remove locking nut, washer, end yoke or companion flange.

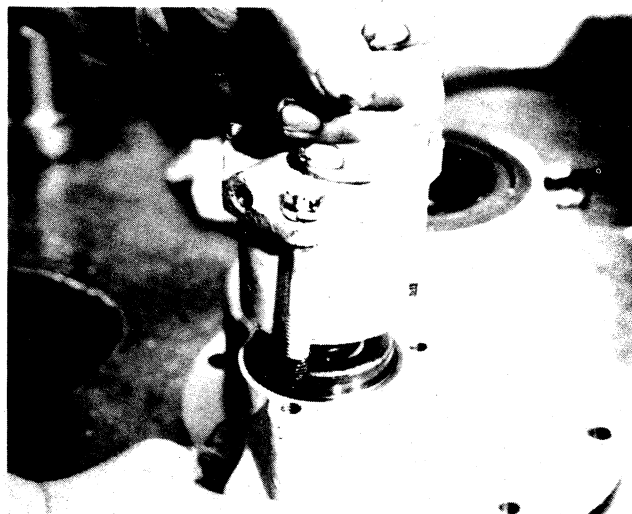


2. Remove unit from transfer case housing.

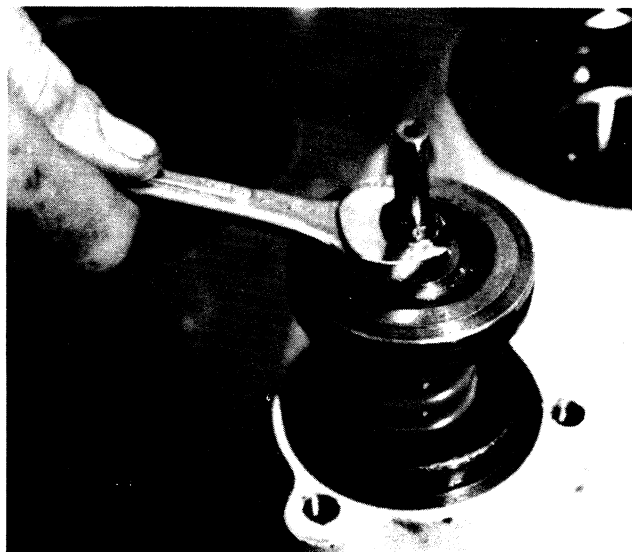


3. Using driver and soft hammer, remove disconnect shaft. Care should be taken to prevent shaft from falling to floor.

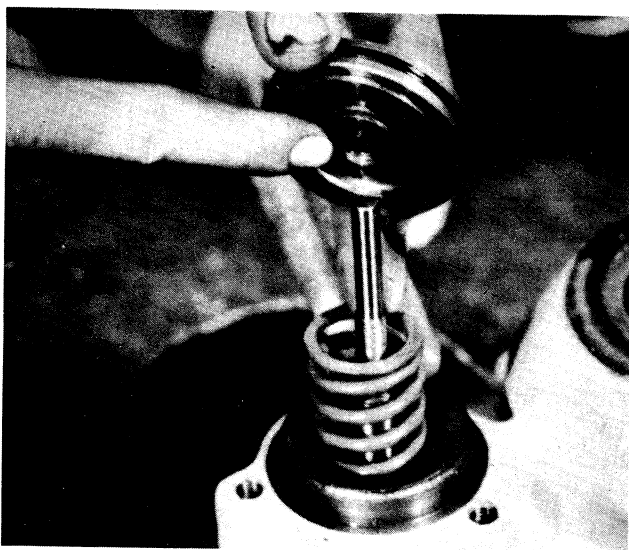
4. Remove indicator switch assembly.



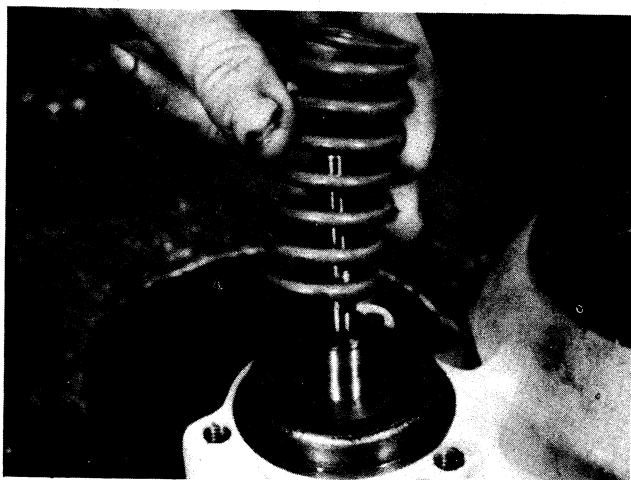
5. Remove three (3) bolts and lockwashers and lift off cylinder cap and cylinder.



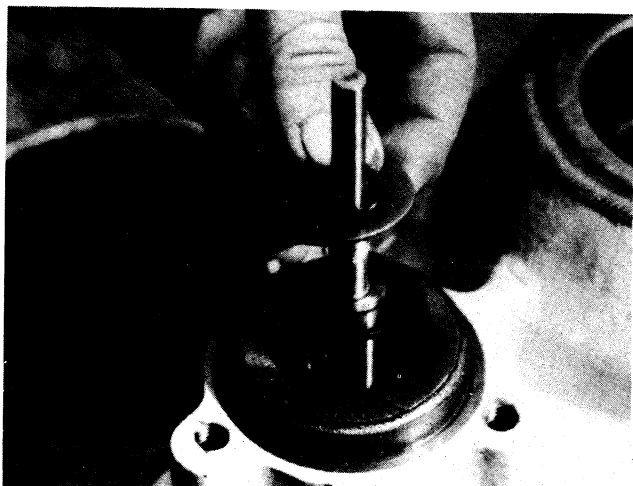
6. Remove locknut and washer from shift fork shaft.



7. Remove piston from shift fork shaft.

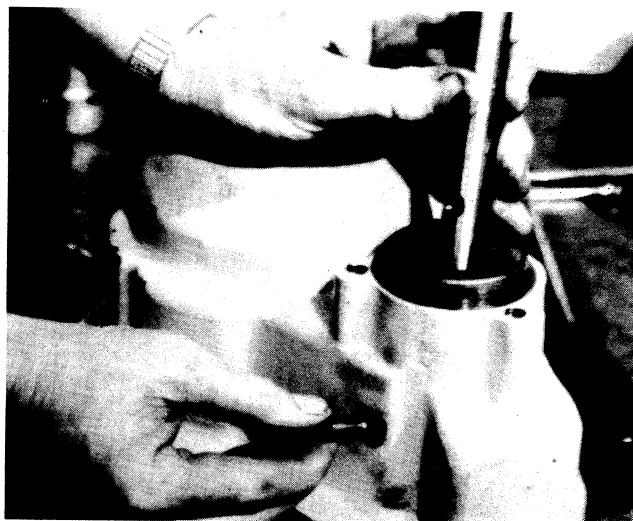


8. Remove spring and "O" ring from shift fork shaft.



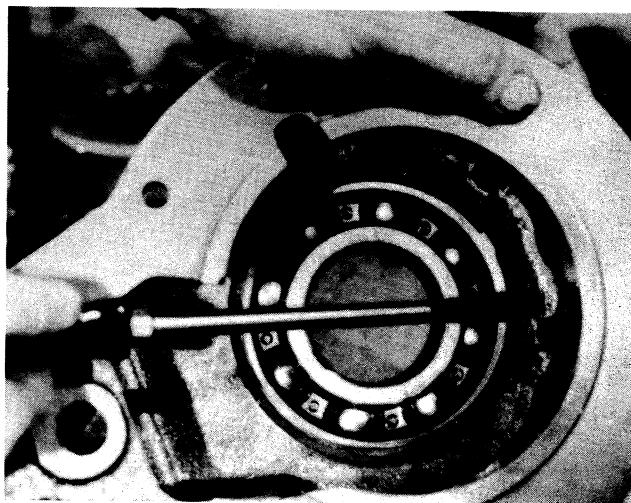
9. Remove spring retainer washer and "O" ring.

**NOTE:** From this point on the procedure for disassembling the disconnect is similar for both the manual shift and the air shift. Remove plug, spring, and poppet ball from manual shift housing.

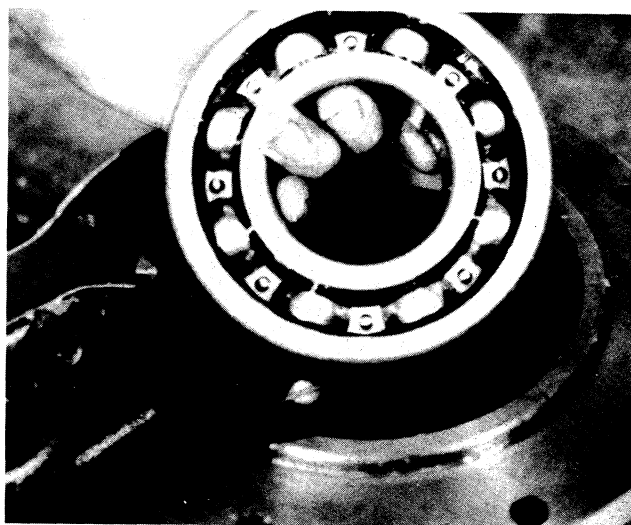


10. Remove pipe plug and shift fork shaft setscrew. Remove shift fork shaft.

11. Turn assembly over and remove shift fork and clutch collar.

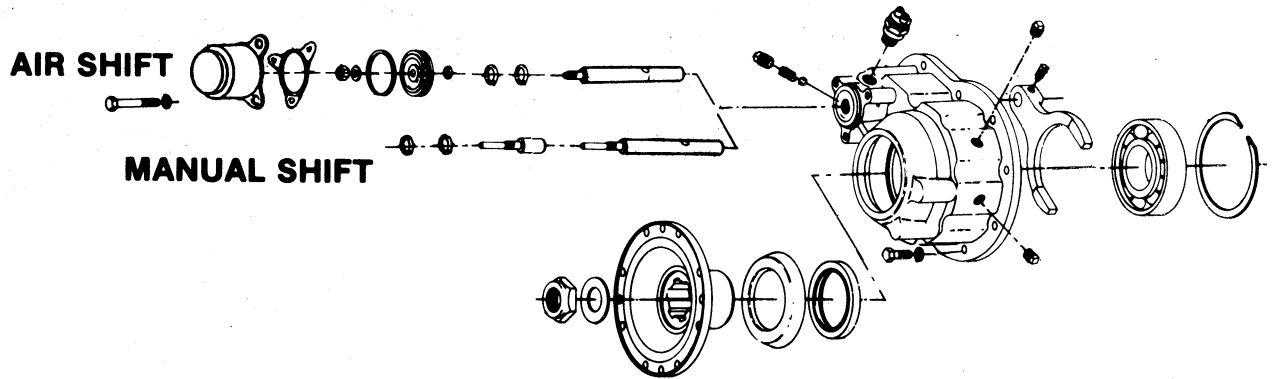


12. Remove bearing retainer snap ring.

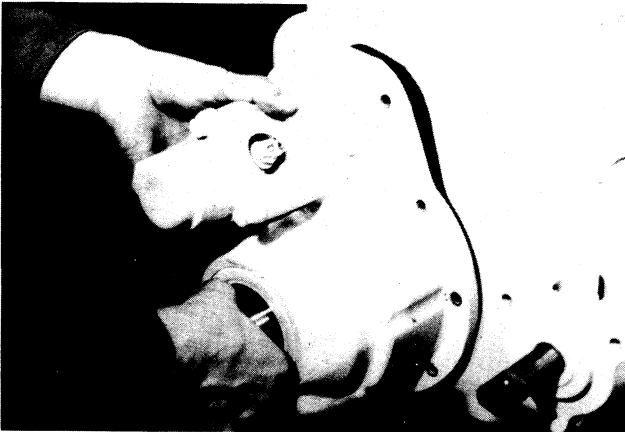


13. Remove bearing and oil seal. Discard oil seal.

## Disassembly Of Air Engaged — Air Disengaged Disconnect And Manual Shift Late Design



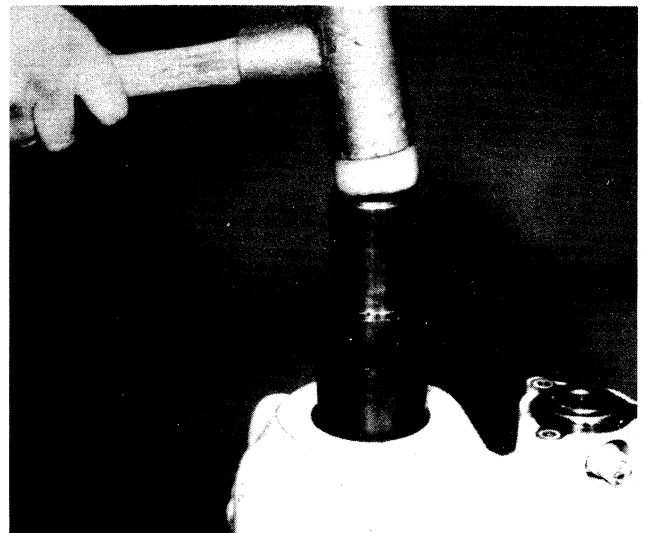
1. Remove locknut and washer disconnect output shaft. Remove end yoke or companion flange.
2. Disengage shift unit by pulling the shifter shaft up or out.



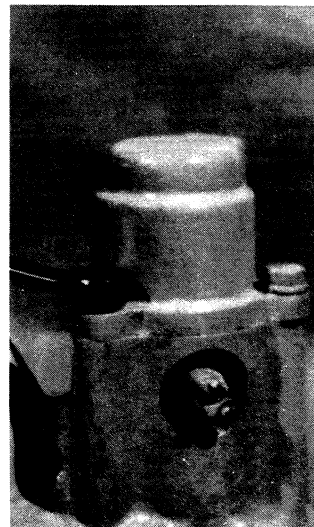
3. Remove (9) bolts and lockwashers from flange of disconnect. Remove disconnect by lifting up and straight away from case. Remove gasket and discard.



4. Remove needle roller bearing from output bearing from shaft.



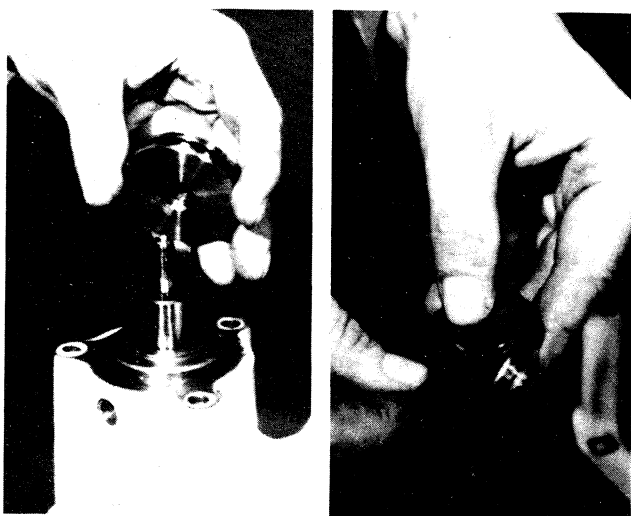
5. Use a press or driver and soft hammer to remove output shaft.



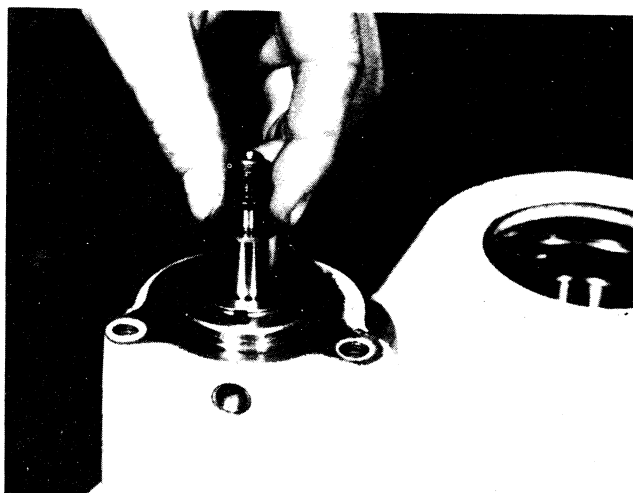
6. Remove (3) bolts and lockwashers and lift off cylinder cap.



7. Remove locknut and brass washer from shift fork shaft.

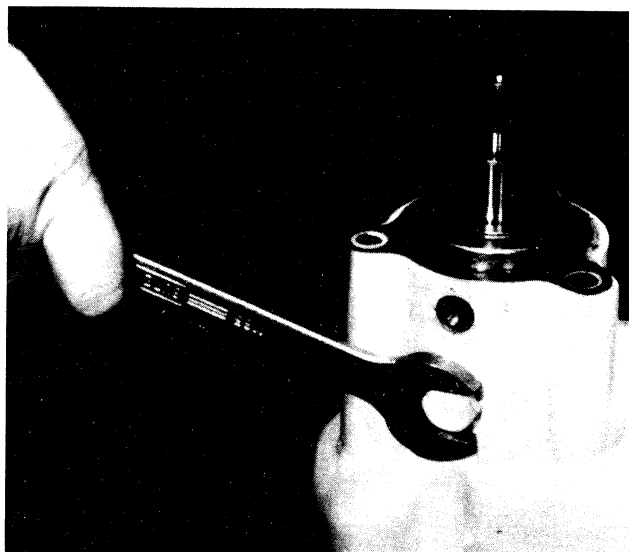


8. Remove piston from shift fork shaft. Remove piston "O" Ring and discard.

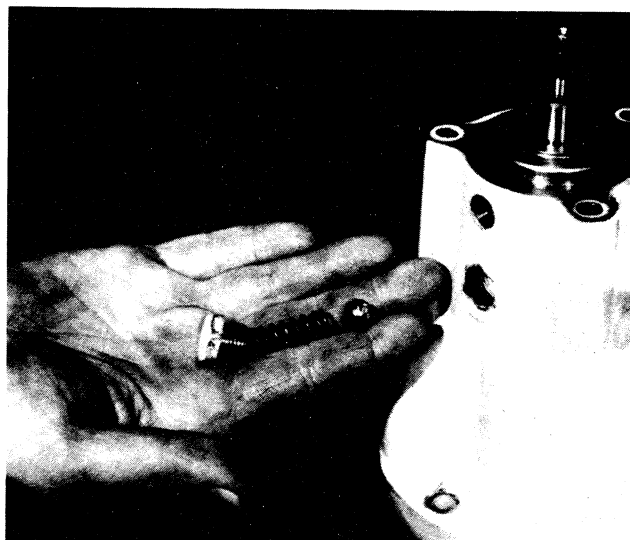


9. Remove "O" Ring from shift fork shaft.

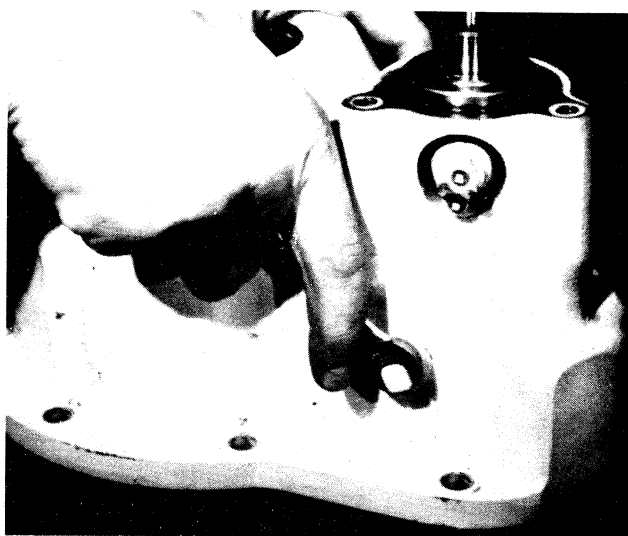
**NOTE:** From this point on the procedure for disassembling the disconnect is the same for both the manual shift and the air shift.



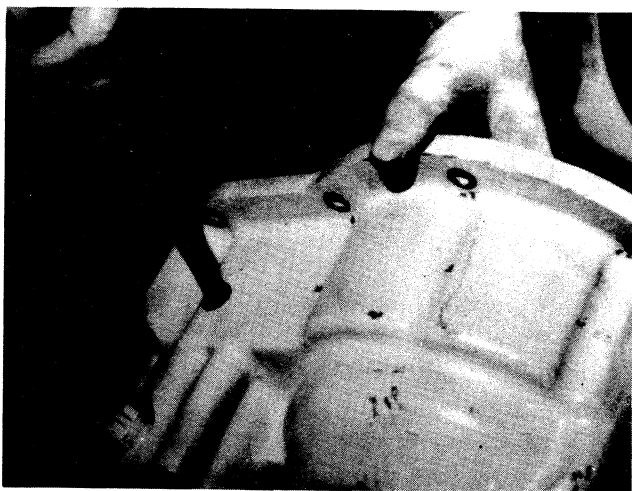
10. Remove hex head poppet plug.



11. Remove spring and poppet ball from assembly.

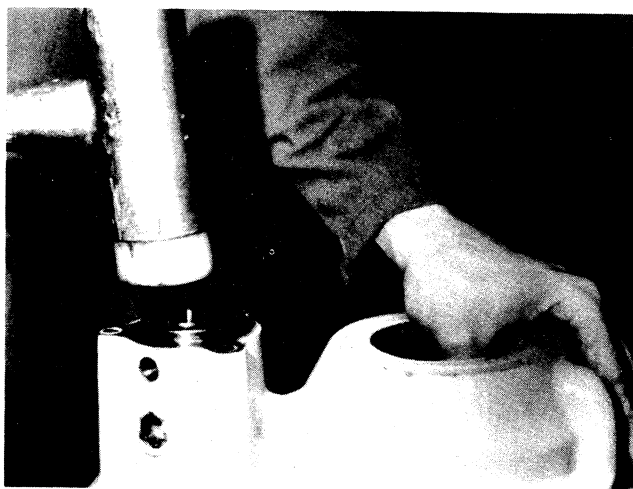


12. Remove square head plug from housing.



13. Use a common screwdriver to remove set screw from shift fork.

14. Remove indicator switch from disconnect housing.



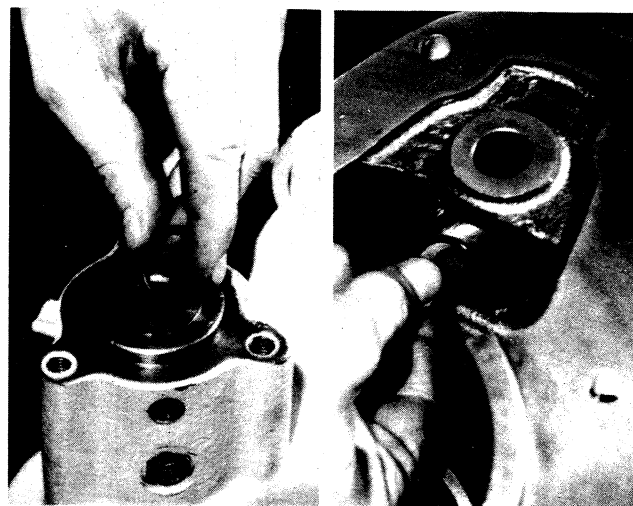
15. Use a soft hammer to tap out shift fork shaft.



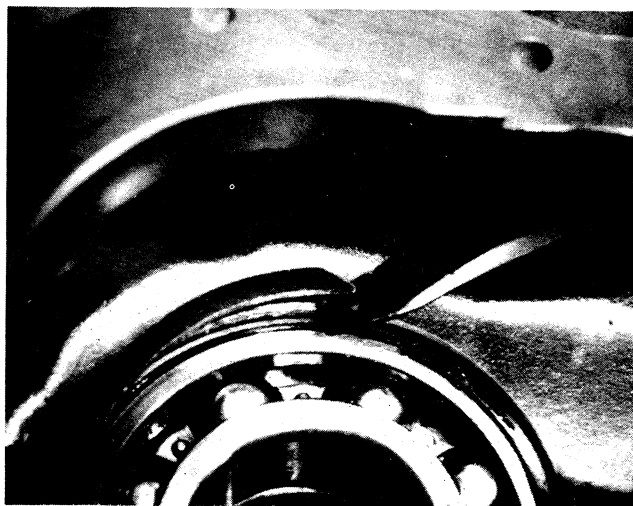
16. Turn assembly over and remove shift fork shaft.



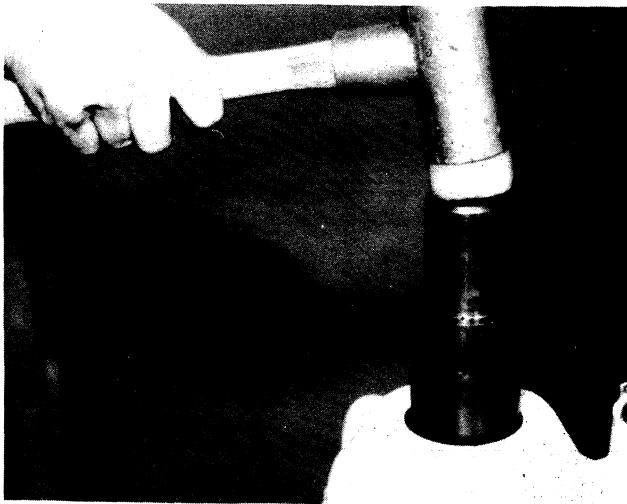
17. Remove clutch collar and shift fork. Inspect clutch collar teeth and shift fork for damage and wear. If shift fork pads show more than .010 inch wear, it should be replaced.



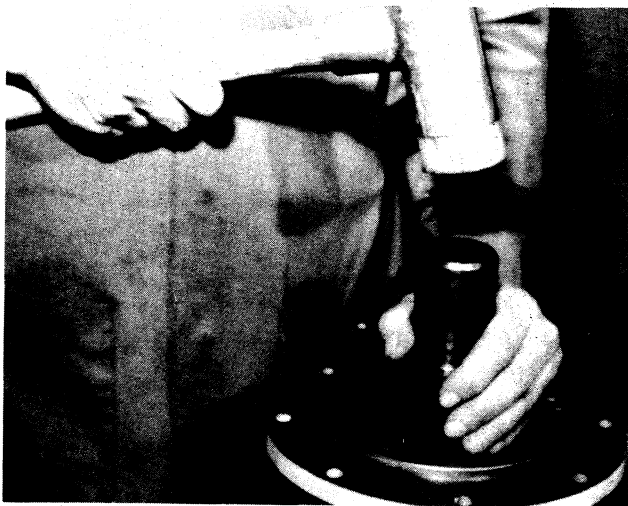
18. Remove (2) "O" Rings from the shift fork shaft inside diameter.



19. Use a common screwdriver to remove bearing retainer snap ring.

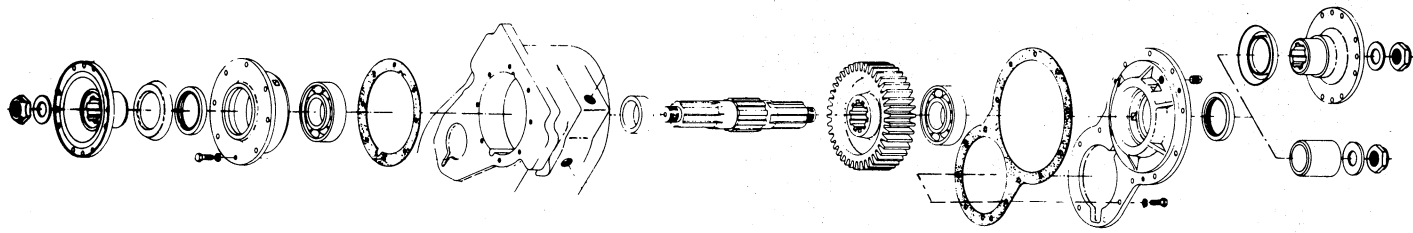


20. Use a driver and soft hammer to remove bearing.



21. Remove seal and discard.

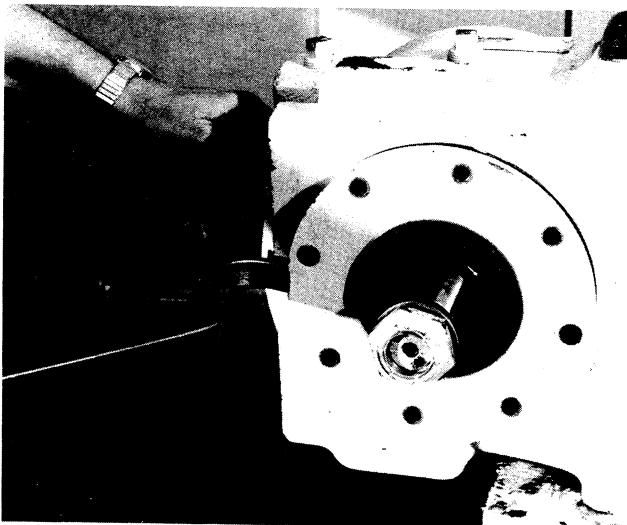
## Upper Shaft Disassembly without Shift Unit



1. Remove locking nut, washer, and companion flange from input shaft.



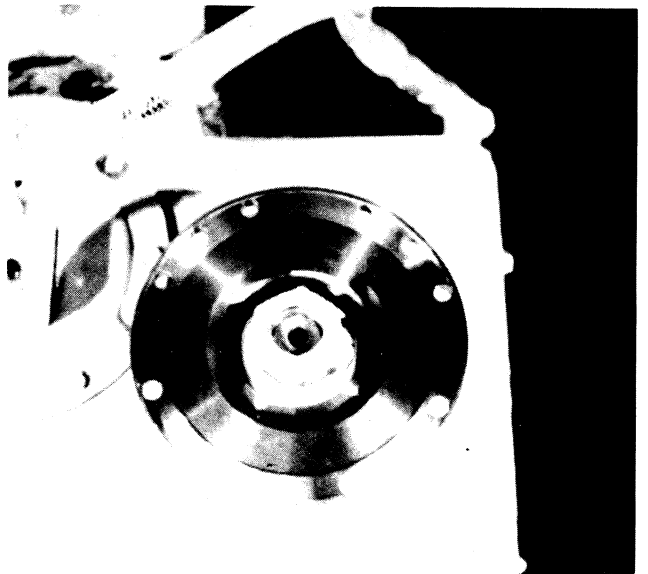
2. Remove eight (8) bolts and lockwashers from bearing cap flange. Remove bearing cap and gasket.



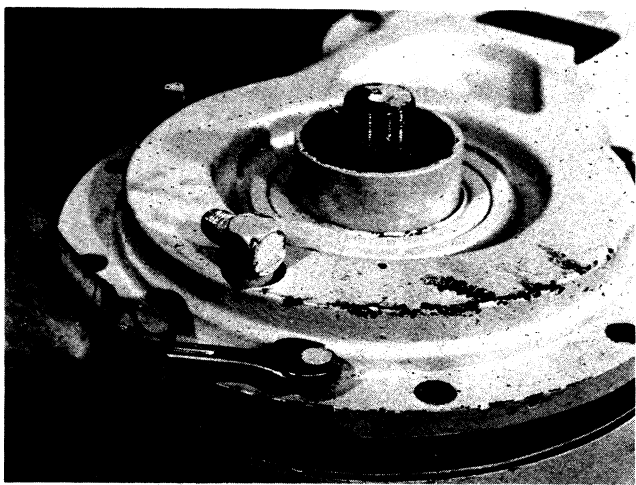
2A. NOTE: Bearing cap has a tight fit and a pry bar may be required.



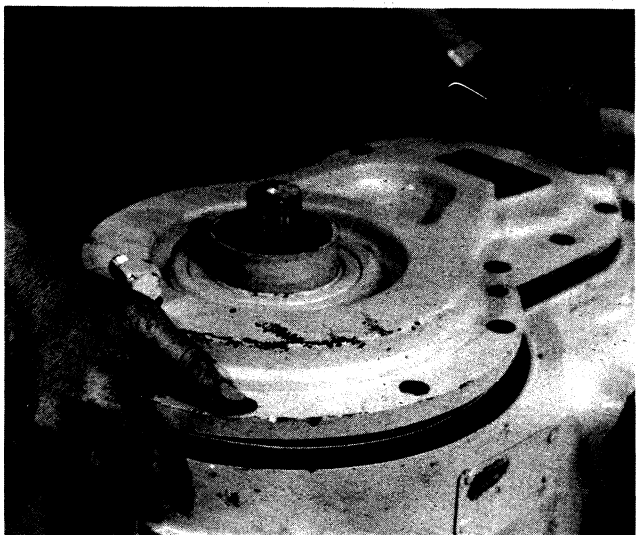
3. Remove spacer from input shaft.



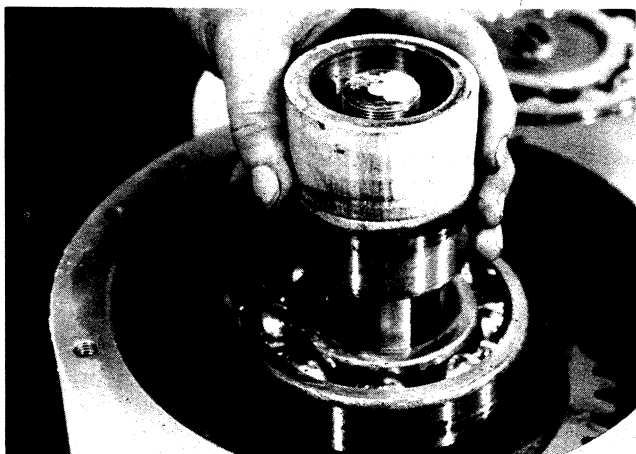
4. Remove locking nut and washer from upper output shaft. Remove end yoke or companion flange, if so equipped.



5. Remove fourteen (14) bolts and lockwashers from rear output bearing cap flange. Insert three (3) bolts in the tapped holes in the flange and tighten to break loose bearing cap.



6. Remove bearing cap and gasket.



7. Remove spacer from output shaft. This spacer is supplied to take the place of an end yoke or a companion flange.

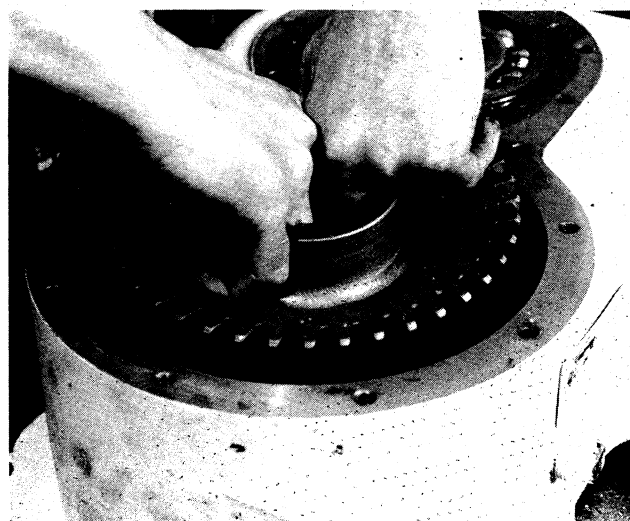


8. Using driver, remove output shaft.

NOTE: Care should be taken to prevent damage to threads or allowing shaft to fall to floor.

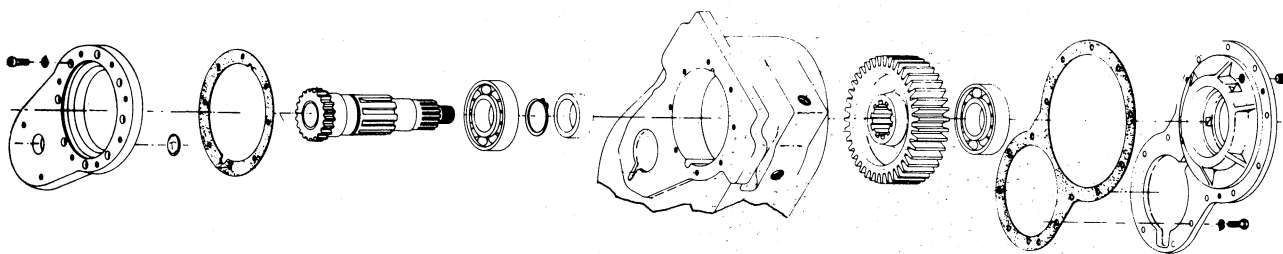


9. Remove bearing from case.

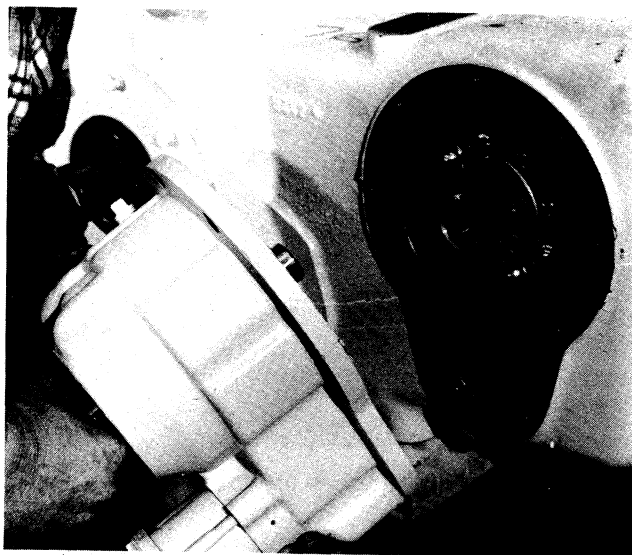


10. Remove gear from case.

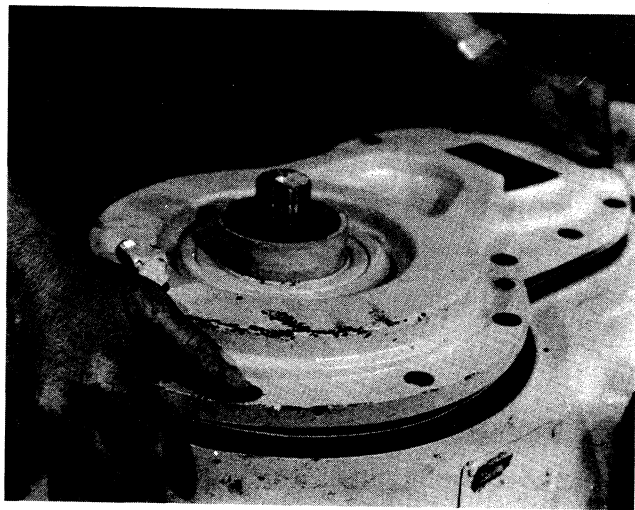
## Upper Shaft Disassembly with Shift Unit



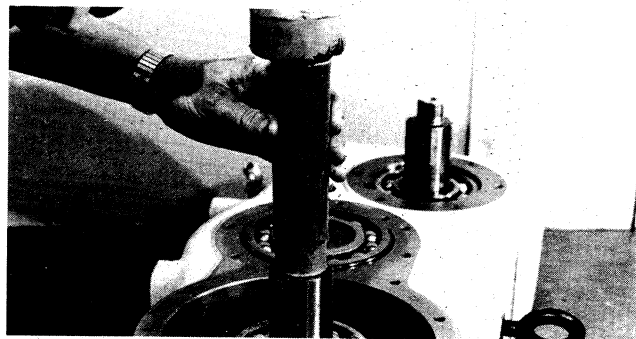
1. Remove shift unit and needle roller bearing as described on page 19.



2. Remove adapter plate and gasket.



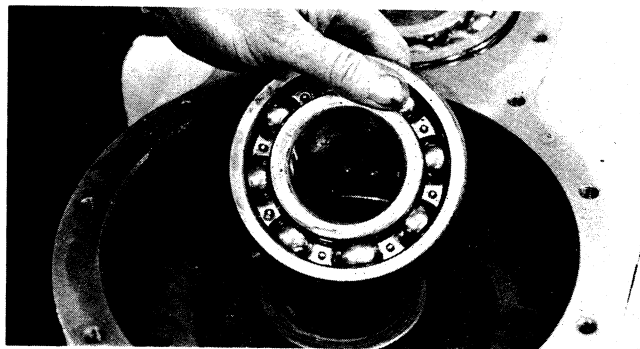
3. Remove the fourteen (14) bolts and lock-washers from rear output bearing cap flange. Insert three (3) bolts in the tapped holes in the flange and tighten to break loose bearing cap.



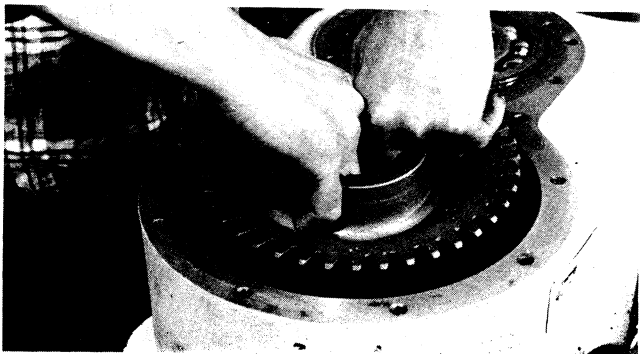
4. Using driver and soft hammer, remove input/output shaft.

NOTE: Care should be taken to prevent damage to threads or allowing shaft to fall to floor.

5. Remove spacer and snap ring from shaft and press off bearing.

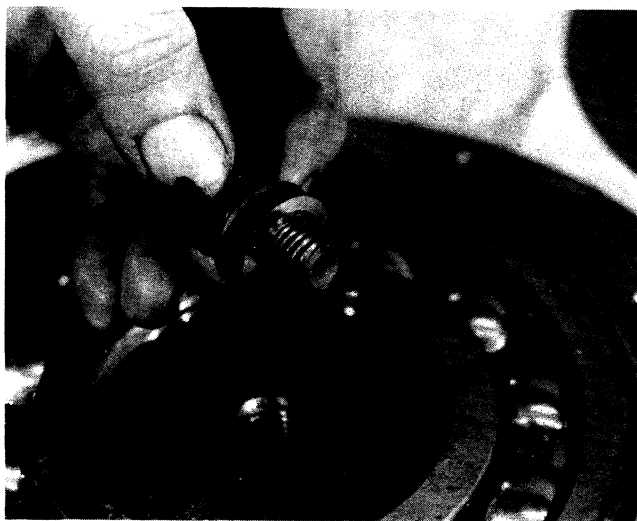
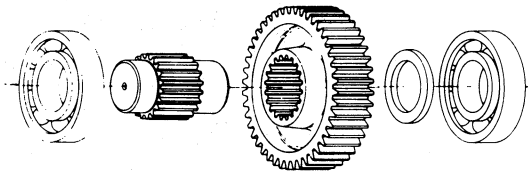


6. Remove bearing from case.

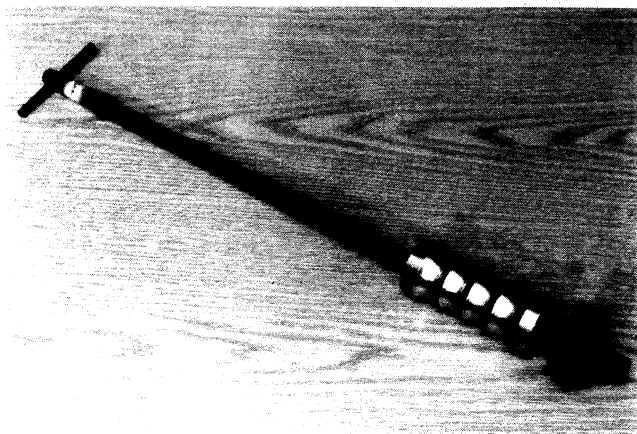


7. Remove input gear from case.

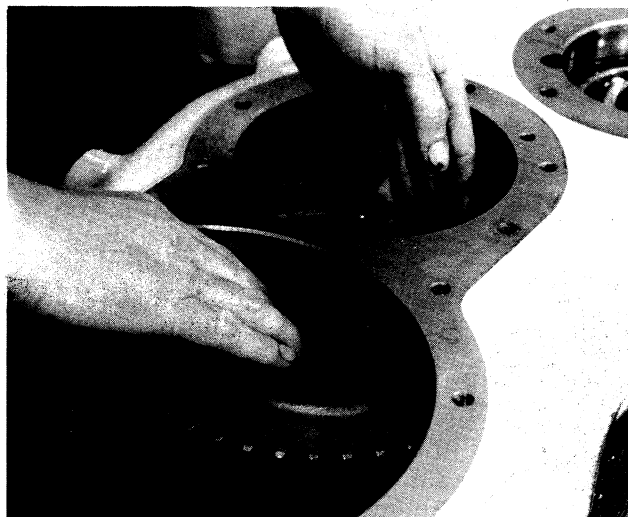
## Intermediate Shaft Disassembly



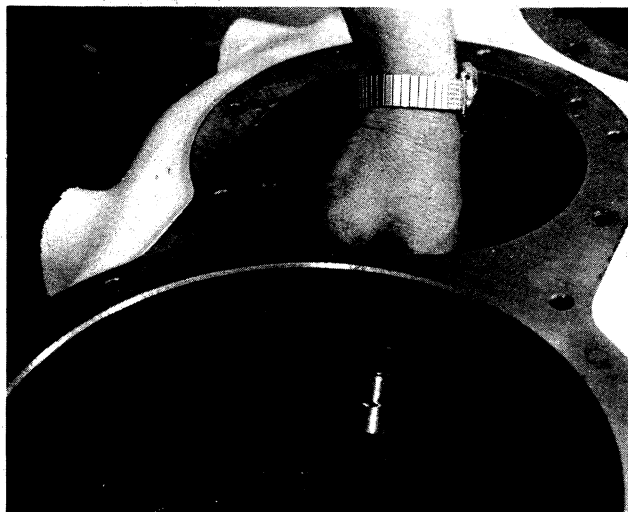
1. Remove pump drive screw and shims if present.



2. Intermediate shaft can be removed with puller-slide hammer as shown above.
3. Screw shaft of puller-slide hammer into tapped hole ( $\frac{1}{2}$ -13 thread) in intermediate shaft, as shown in step #1. Secure with locking nut and remove.
4. Press bearing off intermediate shaft.
5. Remove spacer.

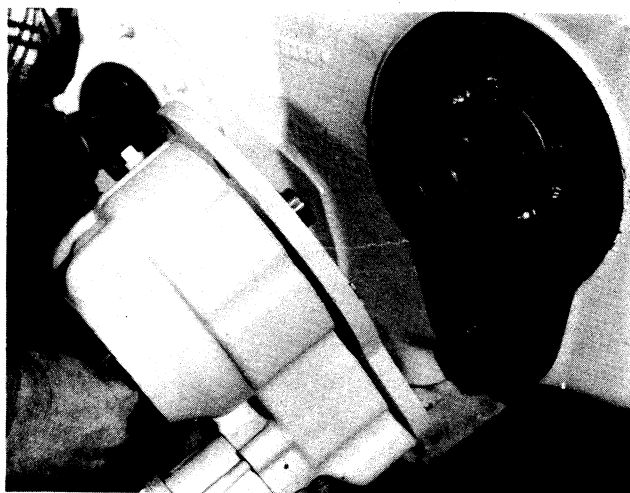
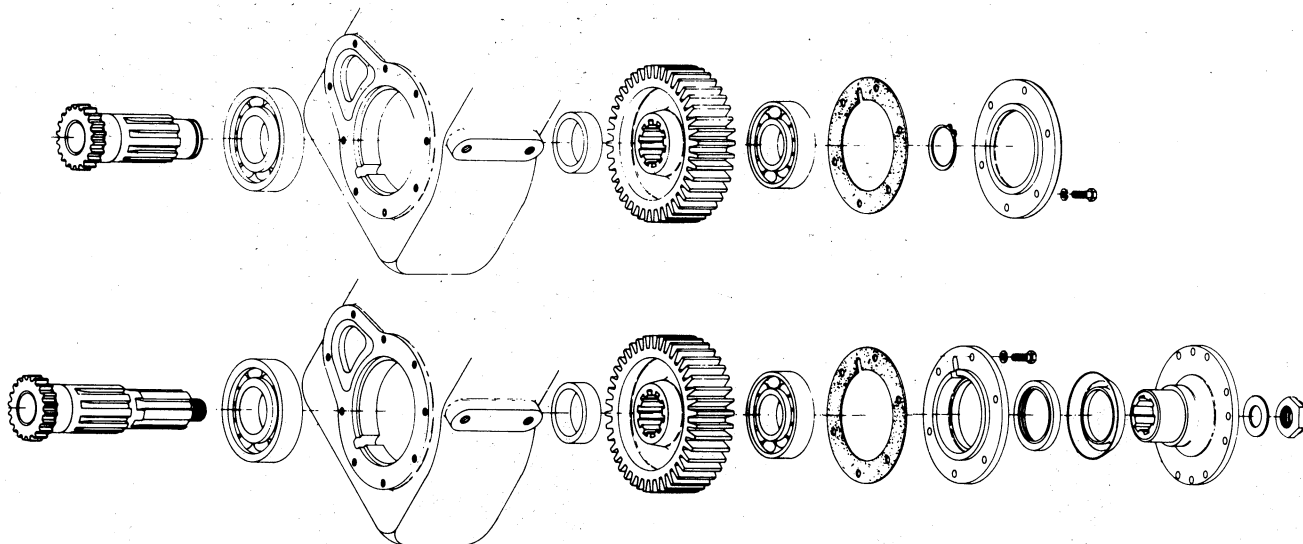


6. Slide intermediate gear to large opening and remove.

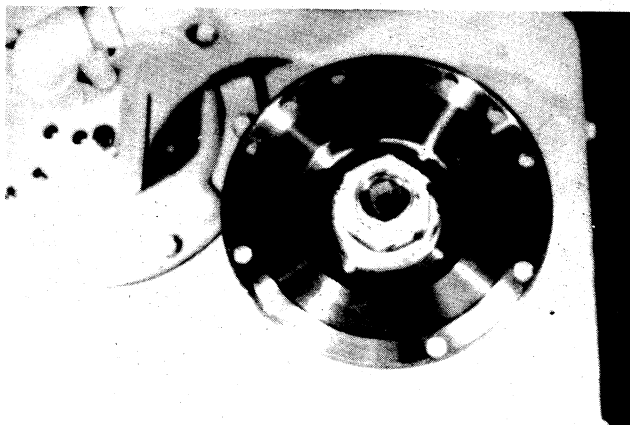


7. Remove bearing from center bore.

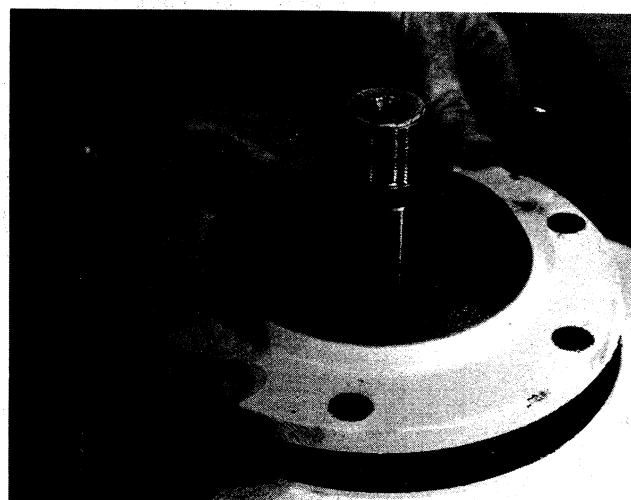
## Lower Shaft Disassembly



1. Remove shift unit from front of case as described on page 19.

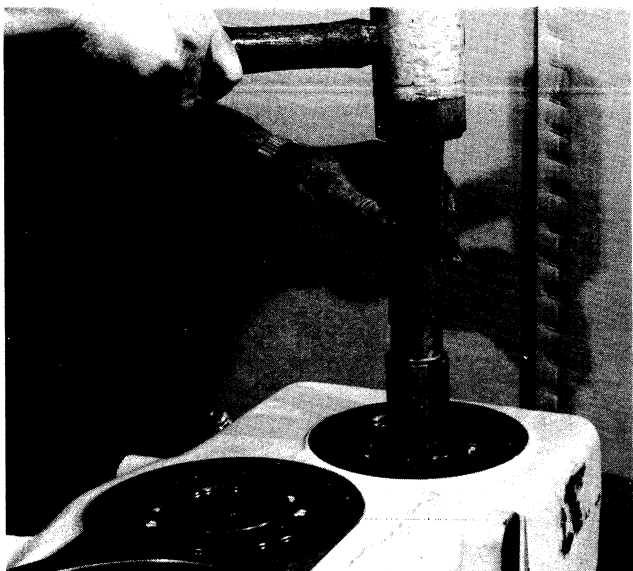


2. Turn unit over and remove locking nut, washer and end yoke or companion flange from rear output shaft.



3. Remove six (6) bolts and lockwashers from output bearing cap flange and remove bearing cap and gasket.
4. For unit that does not utilize a rear output, remove snap ring.

(CONTINUED NEXT PAGE)



5. Using driver, remove output shaft.

**NOTE:** Care should be taken to prevent damage to threads or allowing shaft to fall to floor.



6. Remove spacer and press off bearing.

7. Remove bearing by sliding to large opening.

8. Slide output gear to large opening and remove.

# General Precautions for Assembly

**IMPORTANT: READ THIS SECTION BEFORE  
REASSEMBLY**

**USE ONLY GENUINE REPLACEMENT PARTS  
FOR SATISFACTORY SERVICE**

**USE A PRESS WHERE POSSIBLE WHEN  
ASSEMBLING COMPONENT PARTS.**

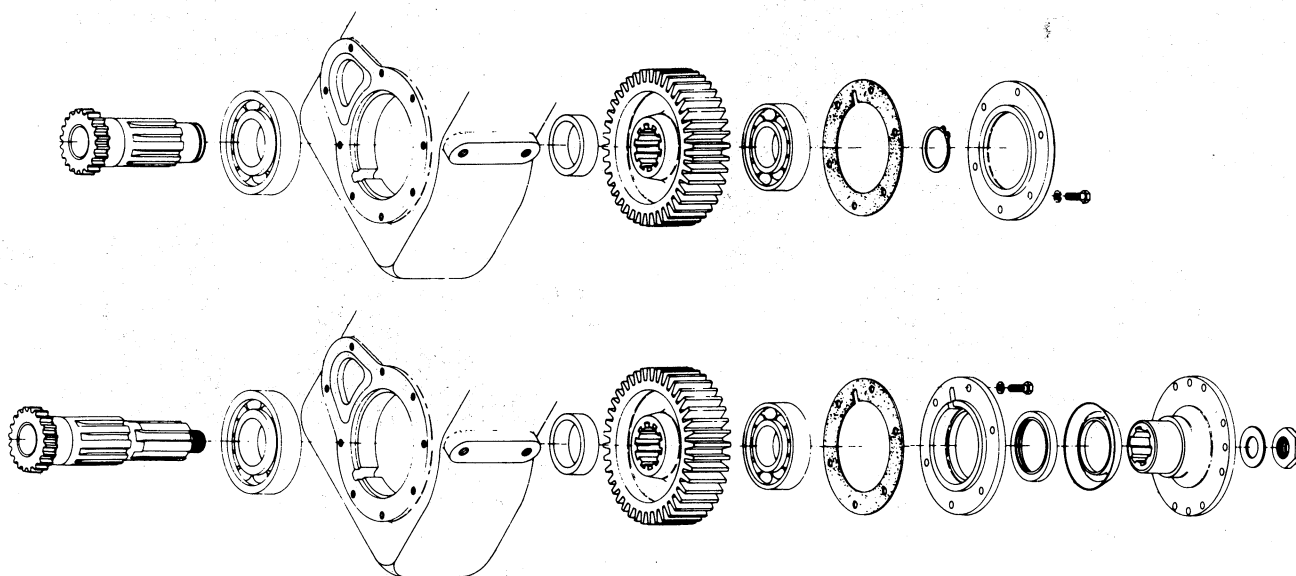
1. **GASKETS:** Use new gaskets and seals throughout when reassembling.
2. **BOLTS:** Make sure all bolts are set to the recommended torques.
3. **LUBRICATION:** Coat seals, "O" rings, and splines with lubricant. This provides an initial lubrication and helps to prevent damage during assembly. For specifications and fill levels, see page 7.
4. **BEARING-FLANGED END:** Bearing drivers are recommended for installation of bearings. Equal forces are applied to both races of bearing which maintain correct bearing alignment with bore and shaft. If another type of driver is used, it is important that the force be applied to either the inner race or the outer race without pushing through the balls.
5. **YOKES AND FLANGES:** Apply grease or lubricant to yoke seal land before pushing through shaft seals. Pull end yoke or companion

flange in place with locknut and torque yoke/-flange nut to 400-450 lb.-ft. Failure to draw down tightly can result in axial movement of the shaft and damage to the bearings. Check to make sure that slinger on yoke or flange does not hit transfer case housing.

6. **GEARS AND SHAFTS:** Check gear teeth surfaces and edges for nicks or burrs which can result in noisy operation. If nicks are found, use a stone to level area around nicks flush with the gear surface. Check shaft splines for burrs which can result in hard shifting or difficult assembly. Stone these likewise.
7. **DISCONNECT OPERATION:**
  - (A) Air pressure (80-120 psi) is needed to shift the air shift disconnect in and out of engagement. Check disconnect operation after installing the air lines and cab control.
  - (B) While installing linkage or cable to the manual shift clevis, care should be taken not to loosen the clevis from the shifter shaft.
  - (C) both the manual and air shift disconnect have an indicator light switch provision which when connected to the battery and a light in the cab will illuminate the light when disconnect is engaged.

**SAFETY GLASSES SHOULD BE  
WORN AT ALL TIMES WHEN  
ASSEMBLING OR DISASSEMBLING**

## Lower Shaft Assembly



1. Place lower output gear into housing HUB UP and slide into position.



3. Position gasket onto housing, aligning bolt holes and oil groove.

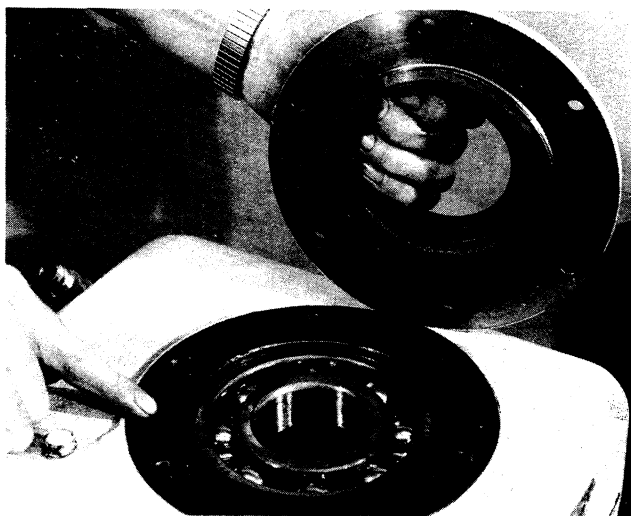
**NOTE:** If shaft that requires snap ring is used, disregard steps 4 & 5 until after shaft is installed.

4. Put a light coat of lubricant on seal and install into bearing cap.

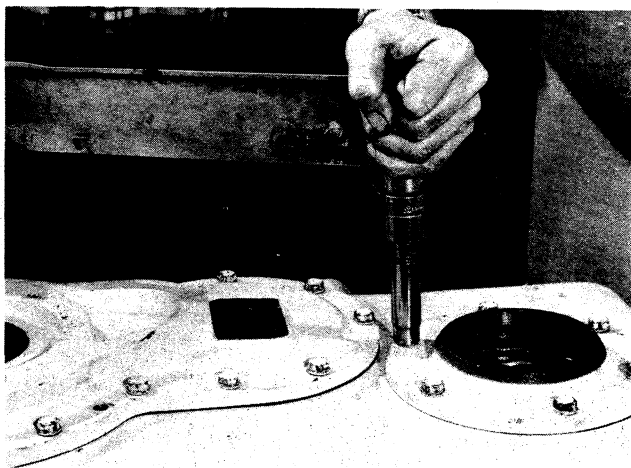


2. Using driver and soft hammer, install bearing into small bore of housing. Recess approximately  $\frac{1}{4}$  inch.

(CONTINUED NEXT PAGE)

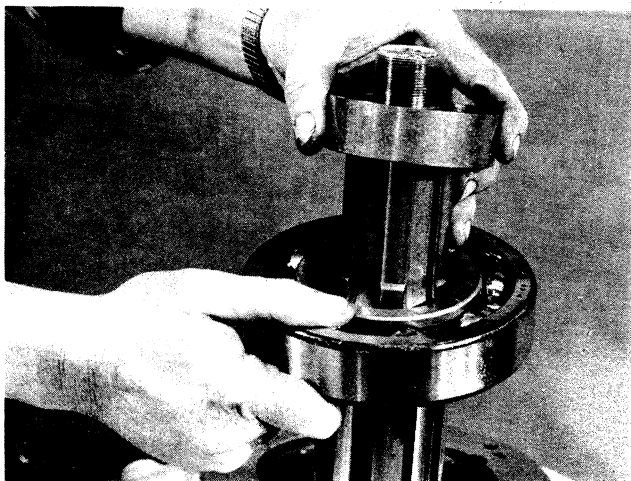


5. Place bearing cap onto housing. Make sure oil groove in bearing cap is aligned with oil groove in housing.

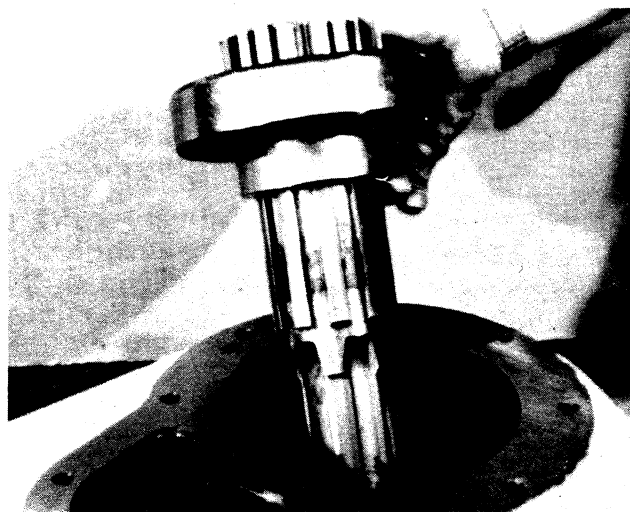


6. Secure with six (6) bolts and lockwashers. Torque bolts to 32-37 ft. lbs.

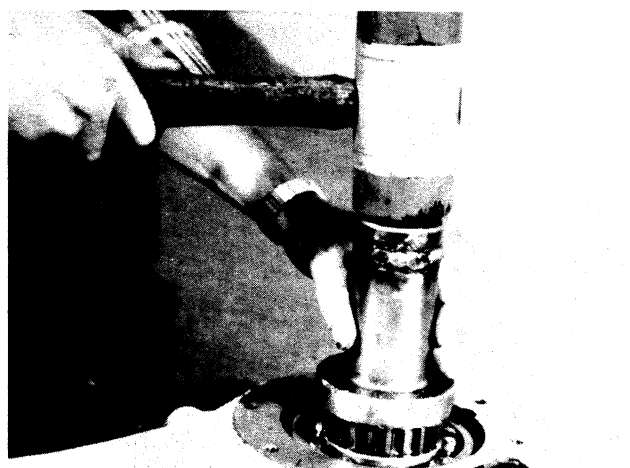
7. Turn assembly over.



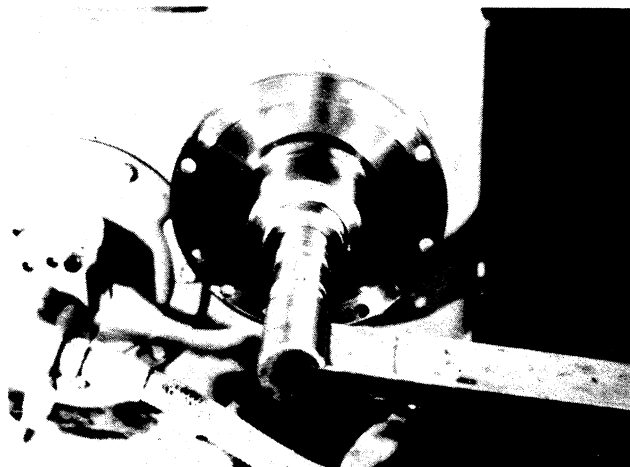
8. Press bearing onto shaft. Install spacer onto shaft.



9. Holding the spacer and bearing, turn shaft over and install in gear.

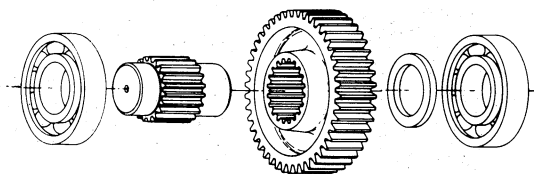


10. Using driver and soft hammer, install shaft.

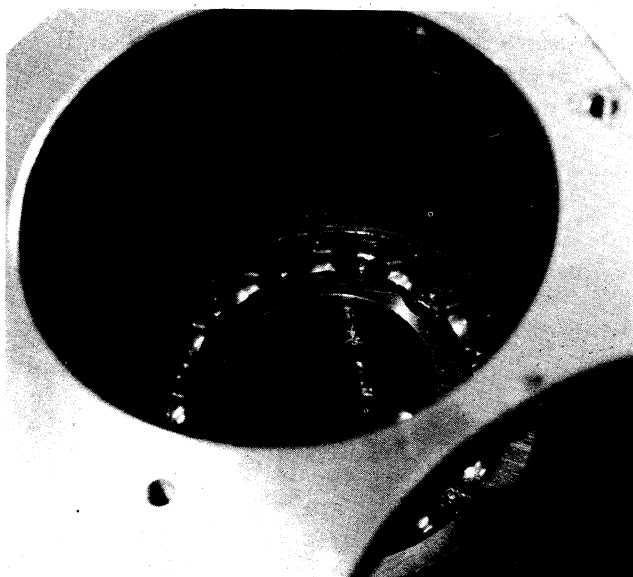


11. Install end yoke or companion flange. Secure with washer and new self-locking nut. Torque nut to 430 ft. lbs.

## Intermediate Shaft Assembly



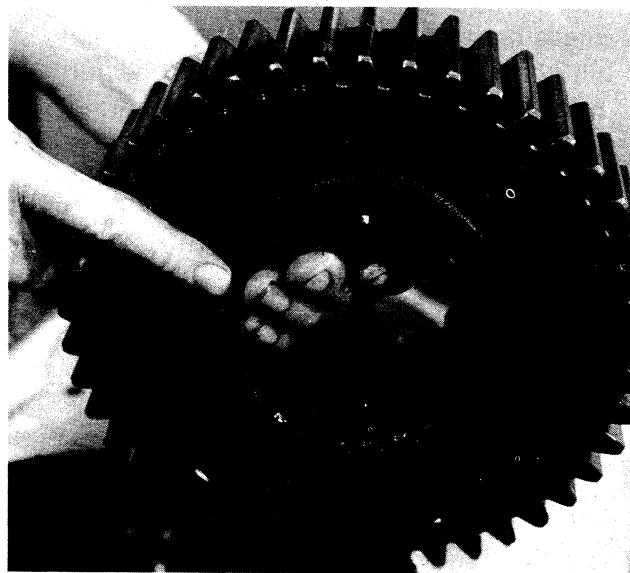
1. Position housing with three holes up.



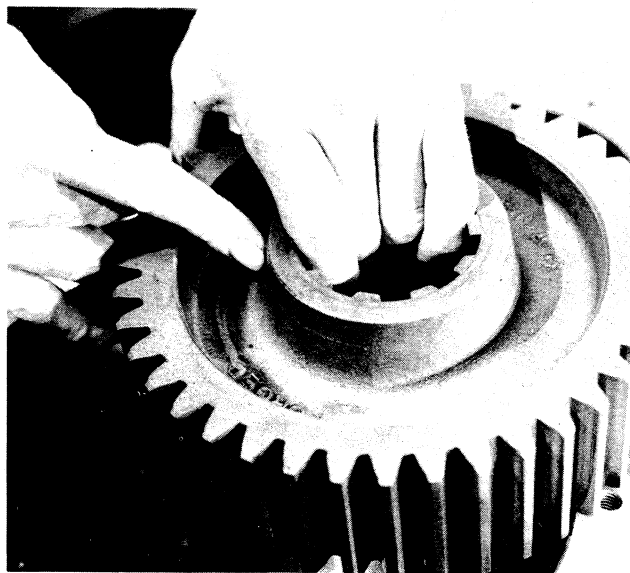
2. Install bearing into center bore of housing.  
Make sure bearing is seated in bearing bore.



3. Place lower output gear, HUB UP, into housing  
and slide to small bore.



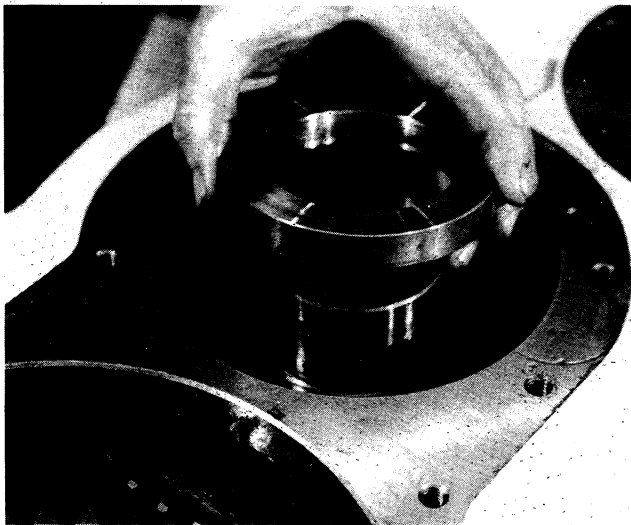
4. Place intermediate gear, HUB DOWN, into  
housing and slide to center of housing.



5. Place upper input gear into housing, HUB UP.



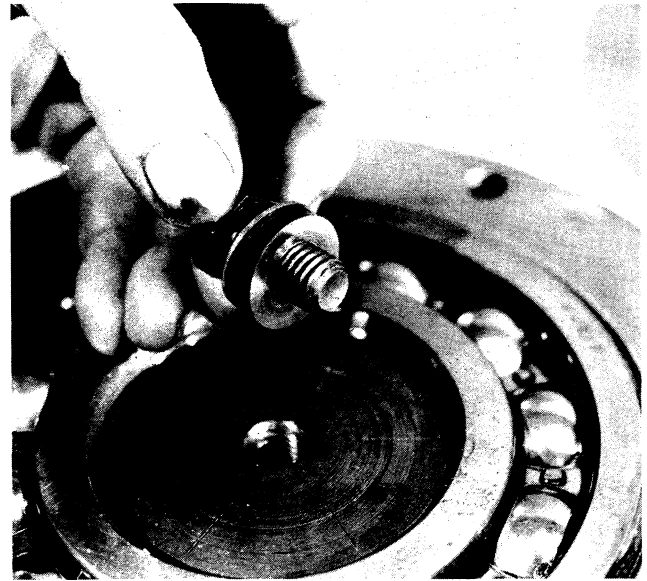
6. Using driver and soft hammer, install intermediate shaft **with threaded hole up**.



7. Install spacer onto intermediate shaft.



8. Using driver and soft hammer, install bearing onto intermediate shaft and into housing.

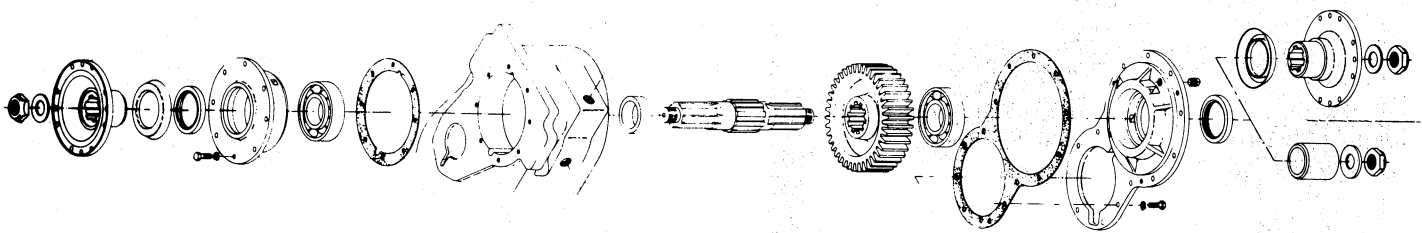


9. If unit has oil pump, install one (.010) shim and one (.050) shim and drivescrew.

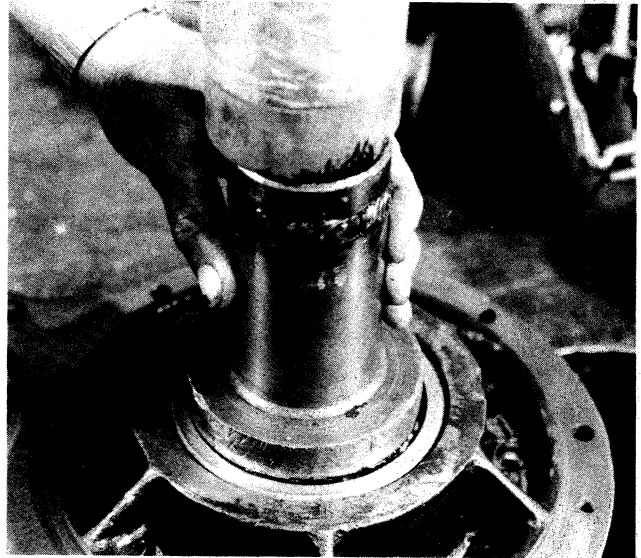


10. Torque drivescrew to 75-90 ft. lb.

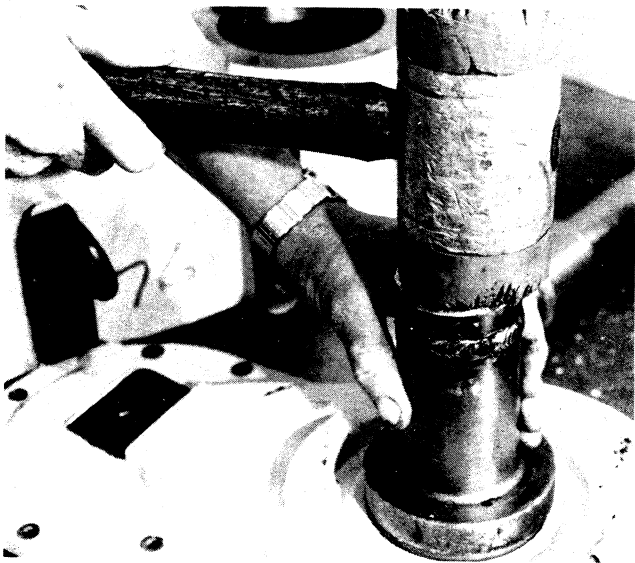
## Upper Shaft Assembly without Shift Unit



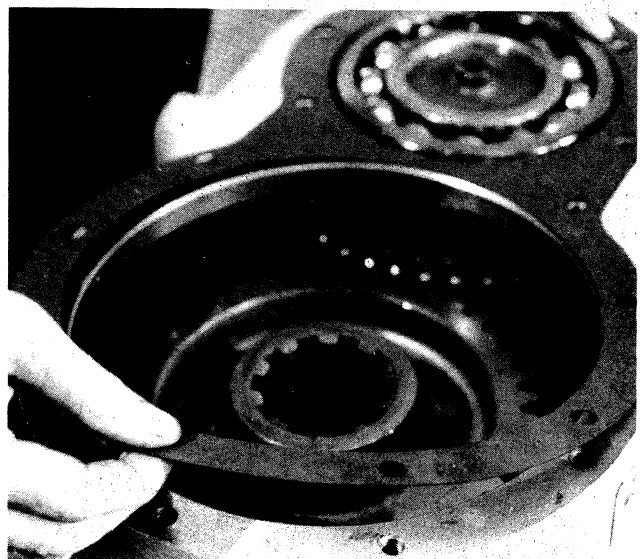
1. Place input gear into housing HUB UP.



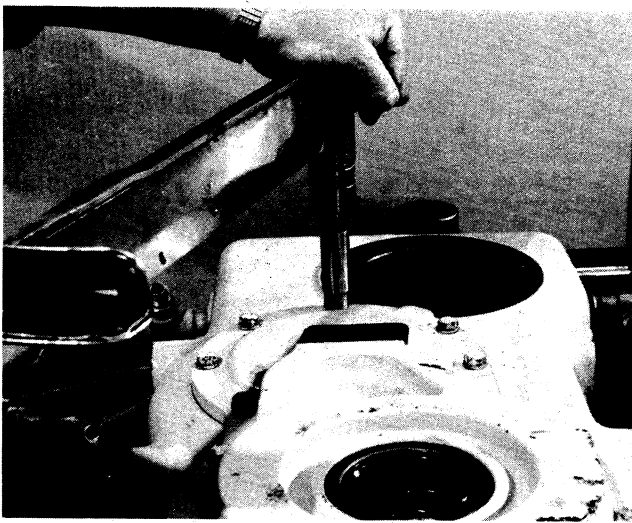
3. Turn input bearing cap over and install bearing.



2. Put a light coat of lubricant on input seal lip and install seal into bearing cap.

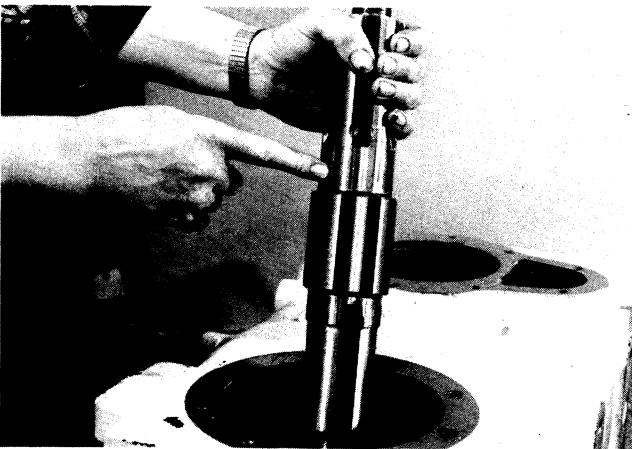


4. Position new gasket on housing, aligning bolt holes.

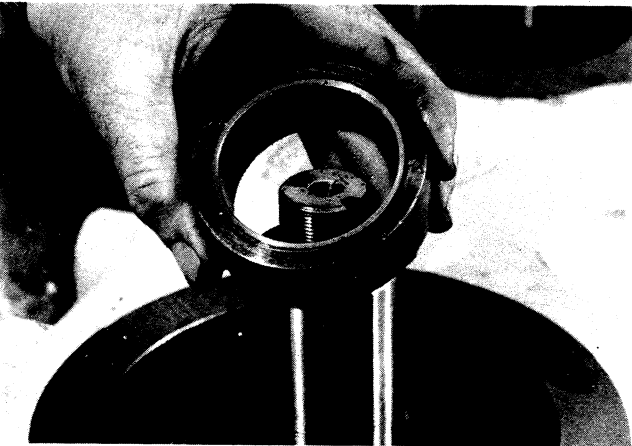


5. Assemble bearing cap to housing. Secure in place with twelve (12) bolts and lockwashers. Torque bolts to 35-40 ft. lbs.

**NOTE:** For convenience, the lower shaft bearing and bearing cap can be installed at this time. Refer to section on **LOWER SHAFT ASSEMBLY**.

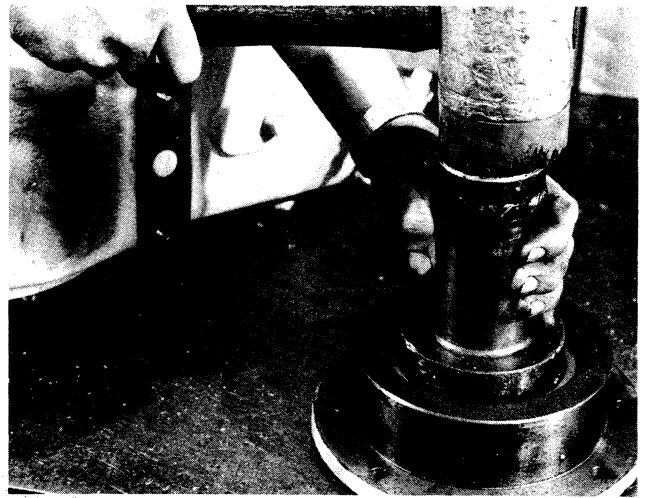


6. Turn assembly over. Install upper input/out—put shaft **LONG SIDE UP**. Push shaft through gear until it bottoms out.

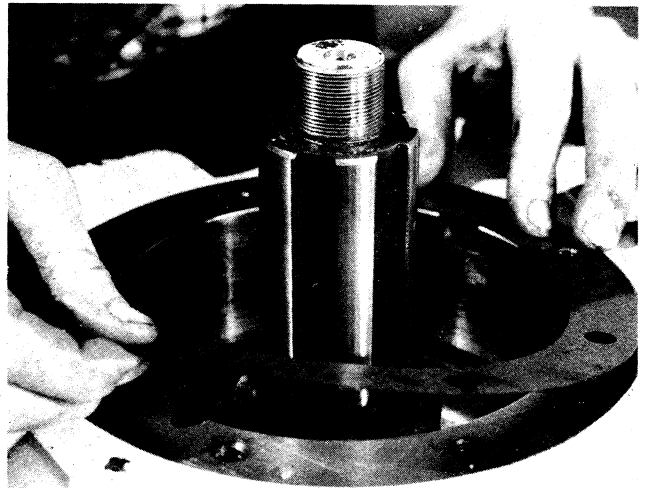


7. Install spacer onto shaft.

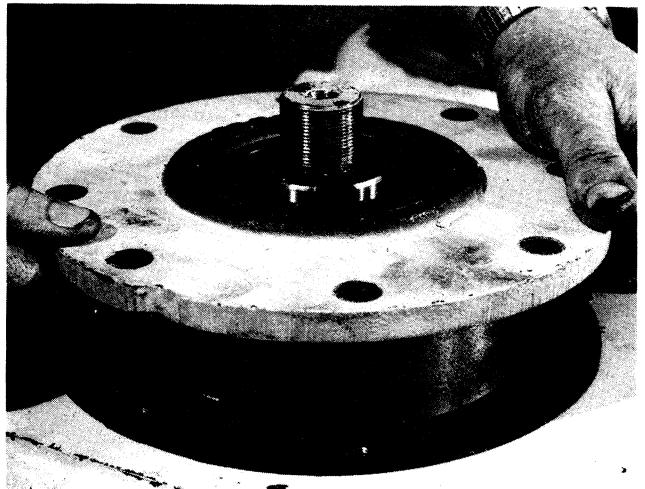
8. Put a light coat of lubricant on seal and install into bearing cap.



9. Turn bearing cap over and press in bearing.

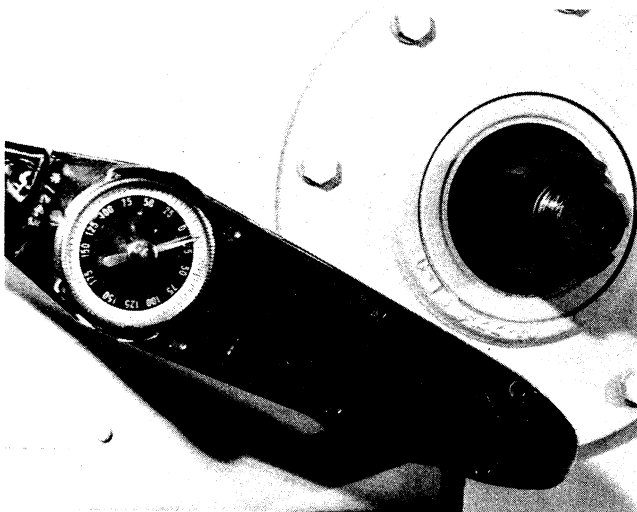


10. Position new gasket on housing, aligning bolt holes and oil groove.

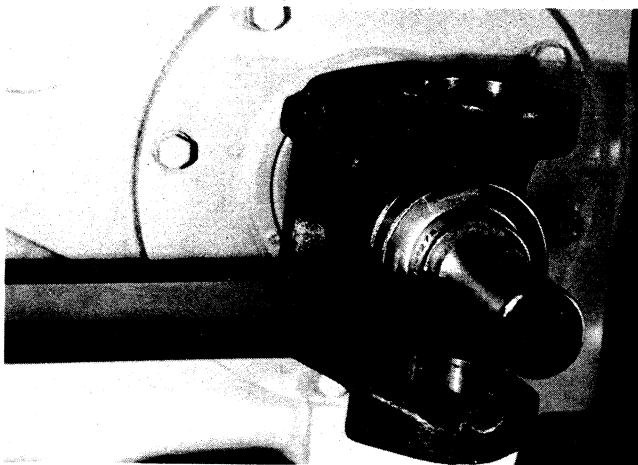


11. Place bearing cap on shaft. Align bolt holes and OIL GROOVE. Using soft hammer, tap bearing cap into position.

12. Secure with eight (8) bolts and lockwashers.

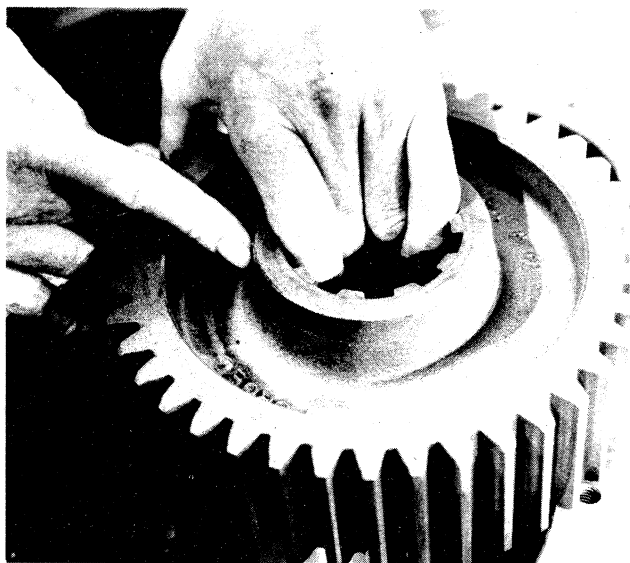
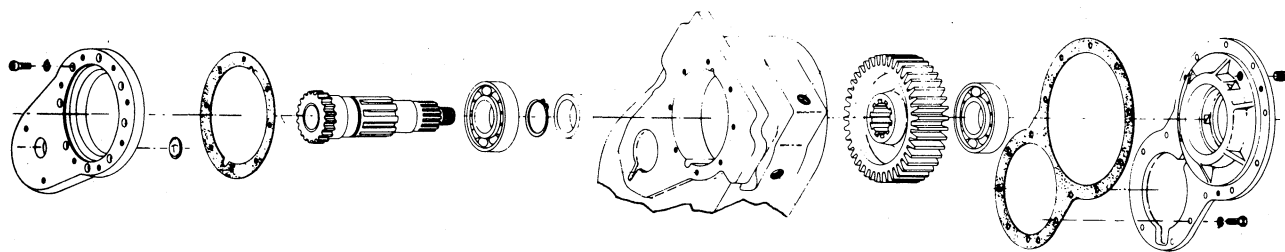


13. Torque bolts to 32-37 ft. lbs.

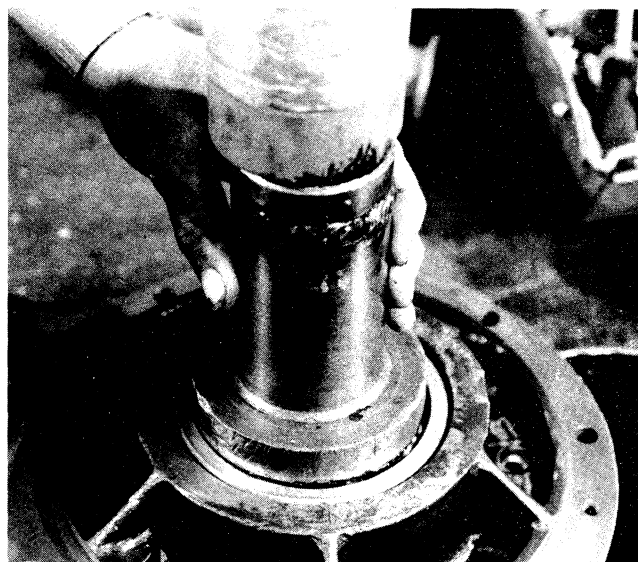


14. Install end yoke or companion flange or spacer on shaft. Secure with washer and new self-locking nut. Torque to 430 ft. lbs.

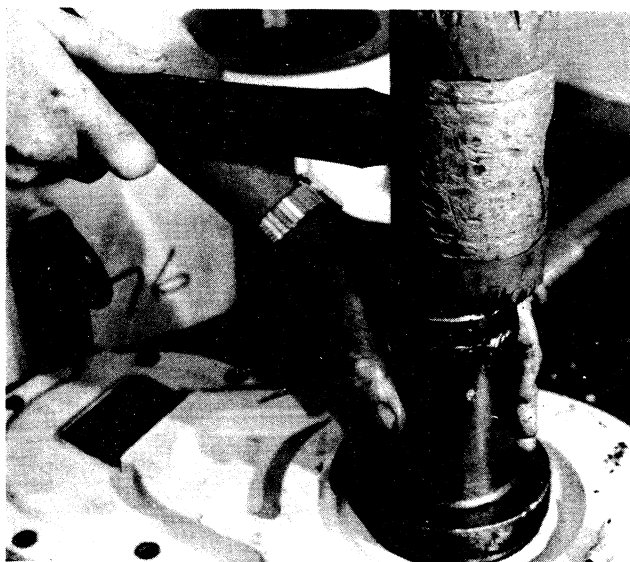
## Upper Shaft Assembly with Shift Unit



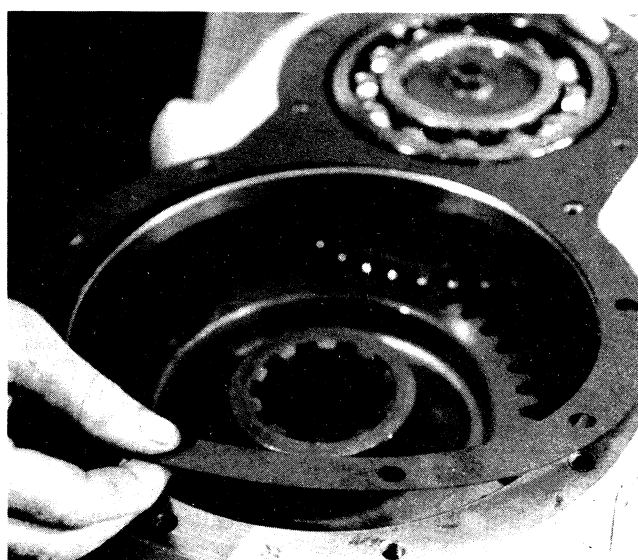
1. Place input gear into housing HUB UP.



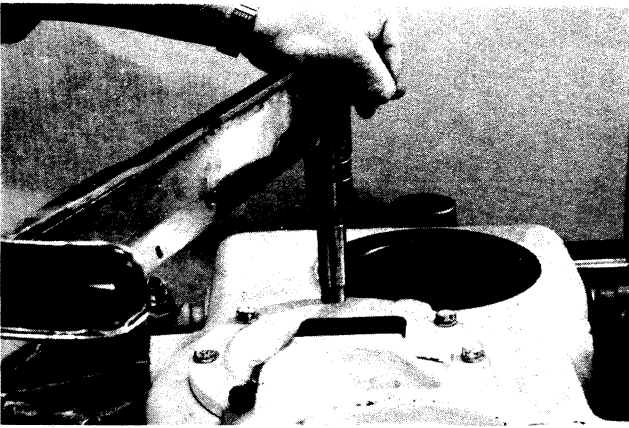
3. Turn input bearing cap over and press in bearing.



2. Put a light coat of lubrication on input seal lip and install into bearing cap.

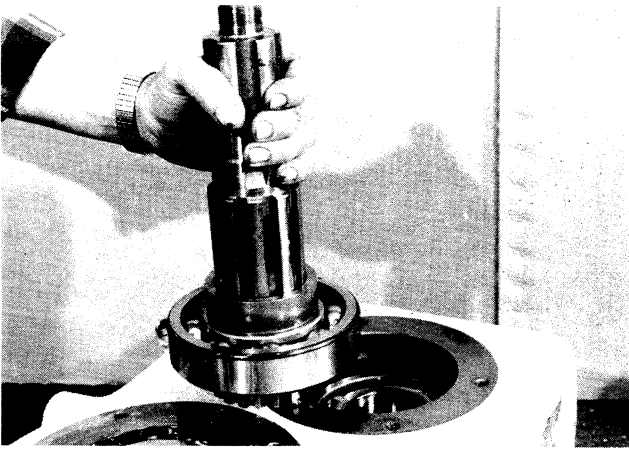


4. Position new gasket on housing, aligning bolt holes.

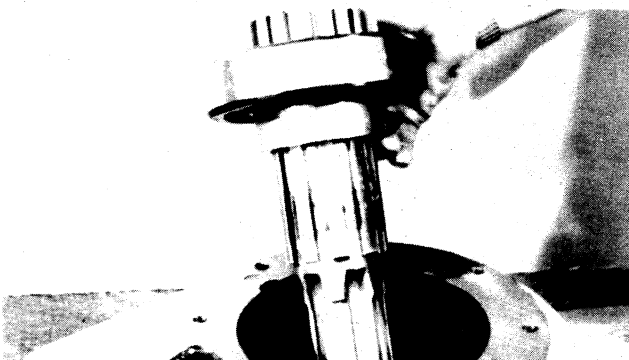


5. Assemble bearing cap to housing. Secure in place with twelve (12) bolts and lockwashers. Torque bolts to 34-40 ft. lbs.

**NOTE: For convenience, the lower shaft bearing and abearing cap can be installed at this time. Refer to section on LOWER SHAFT ASSEMBLY.**

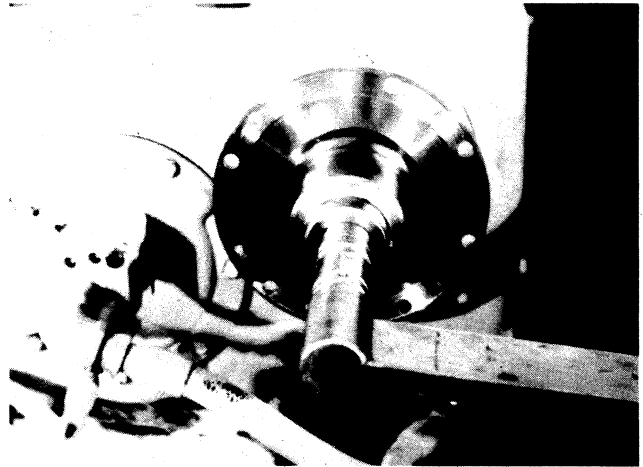


6. Press new bearing onto upper input shaft, and install snap ring into groove. Position spacer onto input shaft next to bearing, as shown.



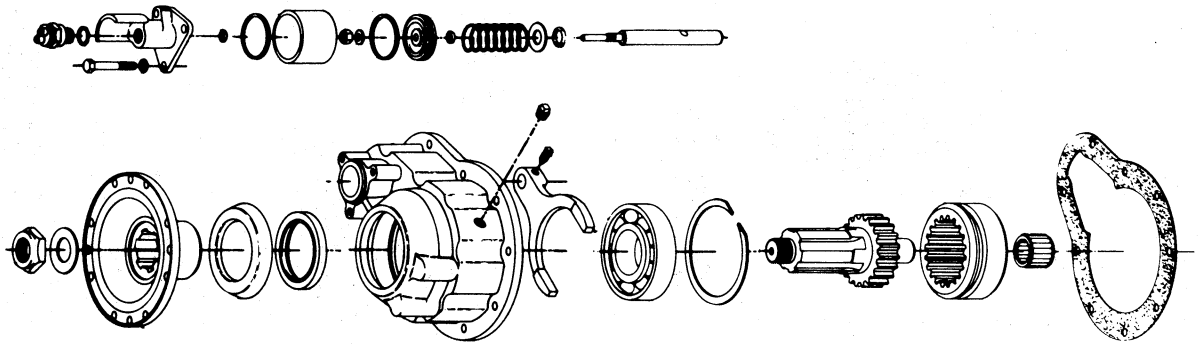
7. Turn transfer case over and start input shaft splines into input gear. Be certain input gear is aligned with opposite bearing, so damage to threads and shaft does not occur. Using a soft hammer, tap shaft through input gear until it bottoms out.

8. Position new gasket onto the housing and install adapter plate. Secure with eight (8) socket head bolts and lockwashers. Torque bolts to 35-40 ft. lbs.

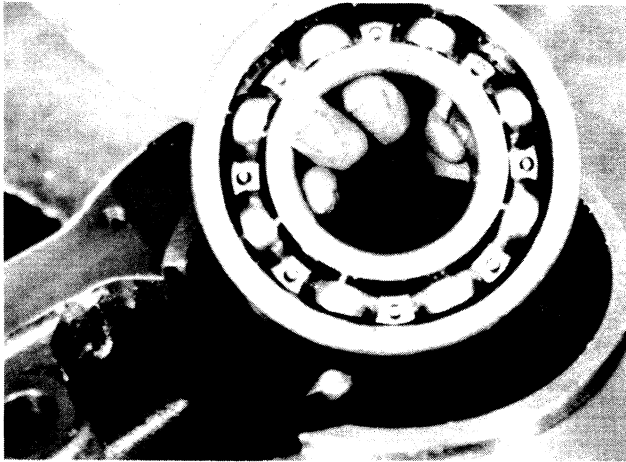


9. Install end yoke, companion flange or spacer onto the shaft. Secure with washer and new self locking nut and torque to 430 ft. lbs. Lubricate roller bearing and install in the end of input shaft. Shift unit can now be installed. Follow procedure outlined in steps 23 and 24 on page 46.

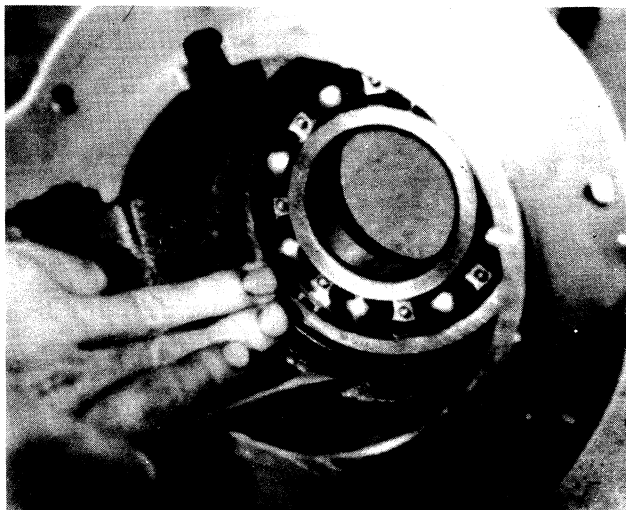
## Assembly of Air Engaged— Spring Disengaged Shift Unit Early Design



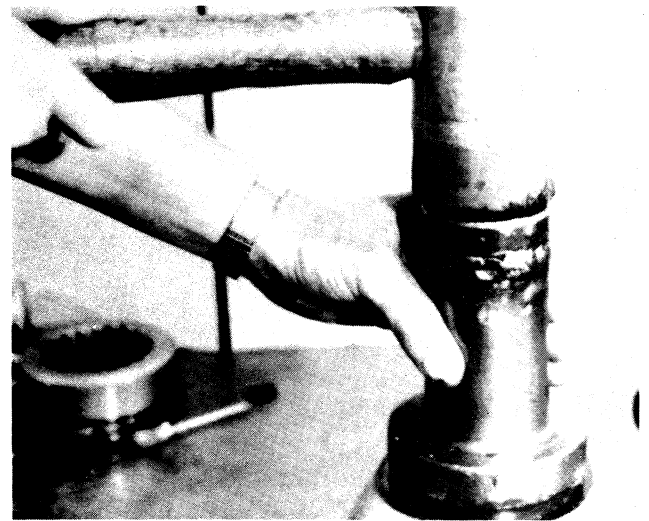
**NOTE:** Steps 1 thru 7 are similar for both manual and air shift units. Add poppet ball, spring, and plug after shift fork shaft has been installed on manual shift units.



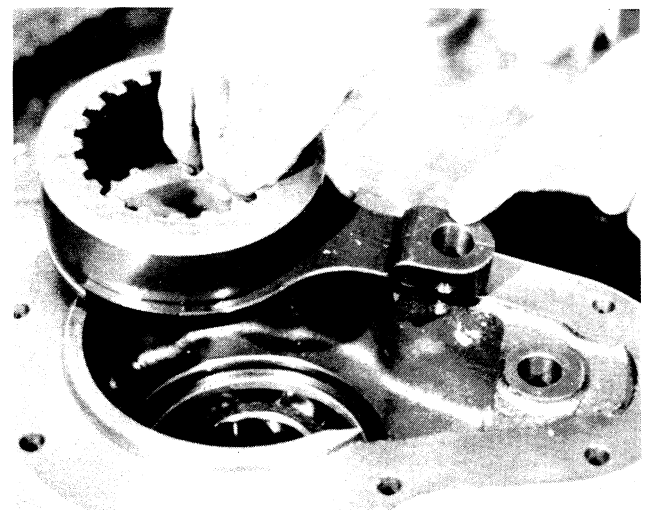
1. Press bearing into shift unit housing.



2. Insert snap ring. Make sure snap ring is completely seated into groove.



3. Turn housing over. Put a light coat of lubricant on seal lip and install seal into housing.



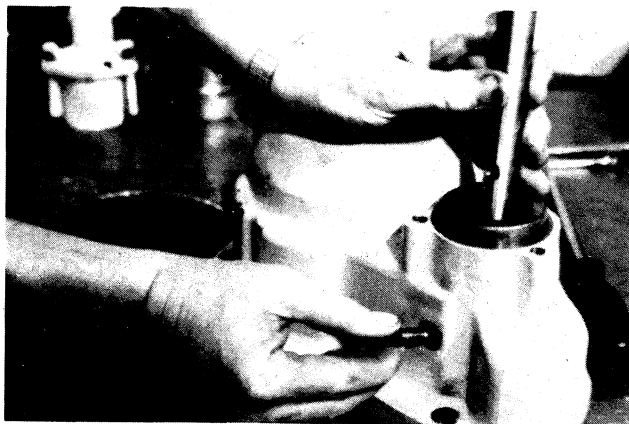
4. Assemble shift fork onto clutch collar. Make sure collar turns freely on shift fork.



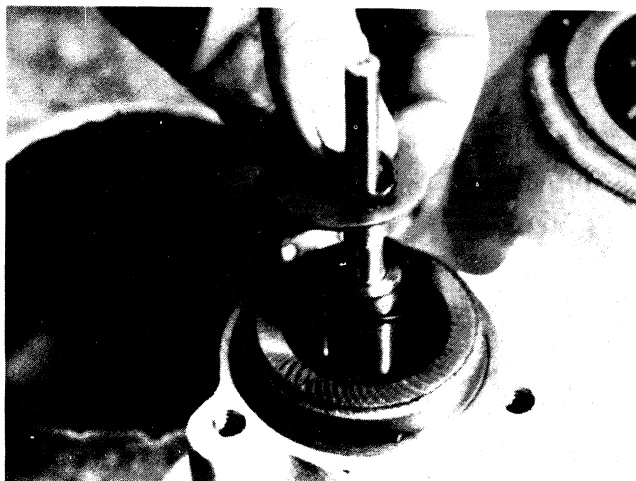
5. Install setscrew into shift fork. Screw in until setscrew is flush with shift fork hole.

6. Install shift fork and clutch into housing.

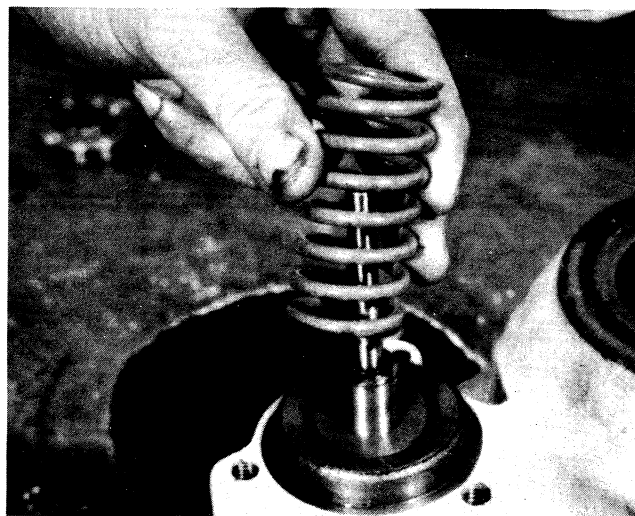
**NOTE:** The shift fork hub and long side of the clutch collar should be pointing up as shown on step 4.



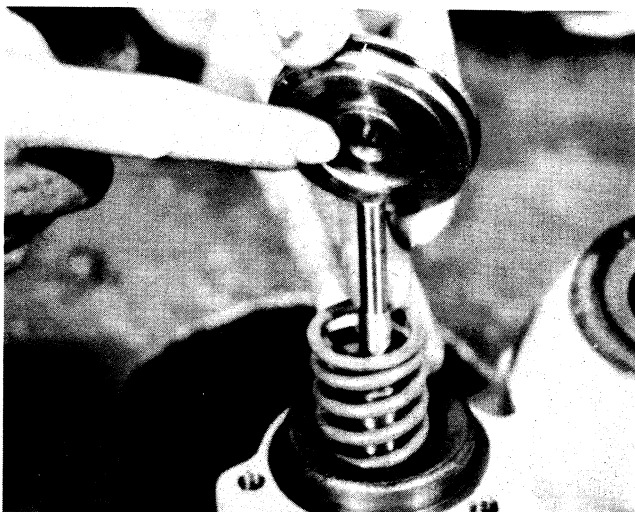
7. Install shift fork shaft into housing. Align set screw. Torque set screw to 30-40 ft. lbs.



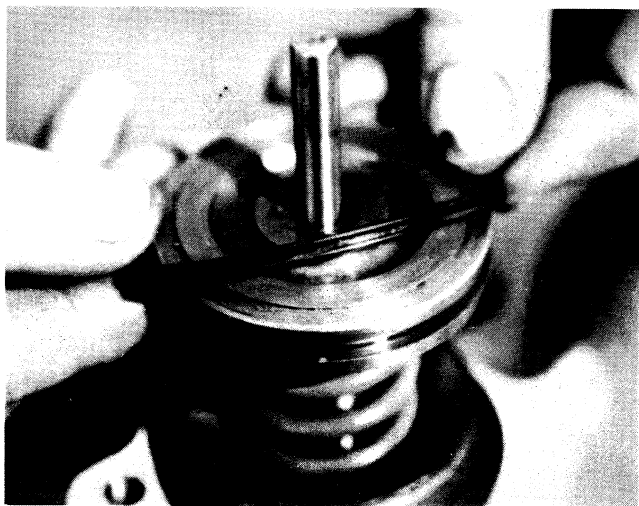
8. Turn housing over. Install the large "O" ring, small "O" ring, and washer onto shift fork shaft as shown.



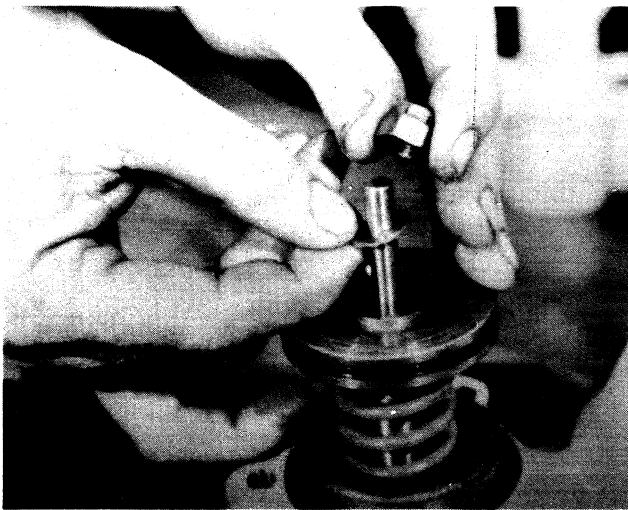
9. Install spring onto shift fork shaft. Push spring to bottom.



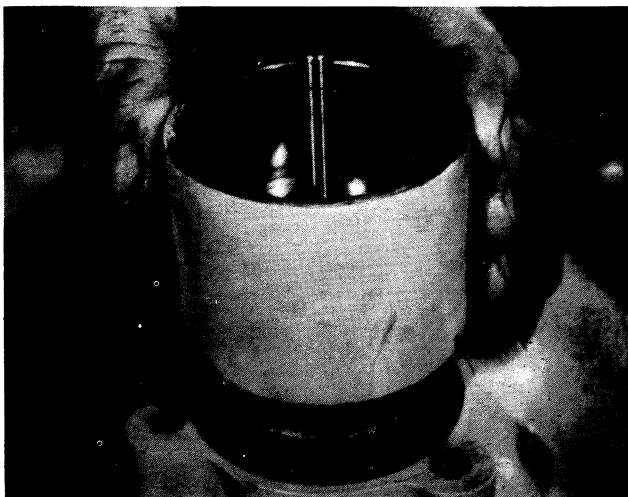
10. Install piston on shift fork shaft COUNTER BORE DOWN.



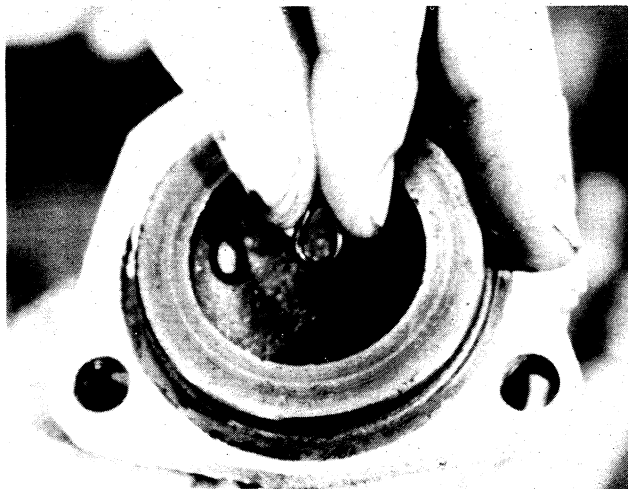
11. Assemble "O" ring onto piston.



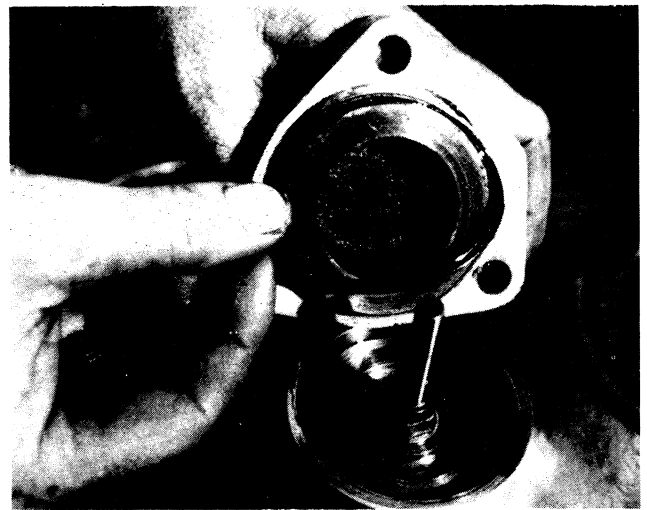
12. Secure in place with washer and locknut. Torque nut to 15-20 ft. lbs.



13. Make sure cylinder wall is clean. Put a light coat of lubricant on cylinder wall and place over piston and push to bottom.



14. Install "O" ring in cylinder cover shift fork shaft hole.

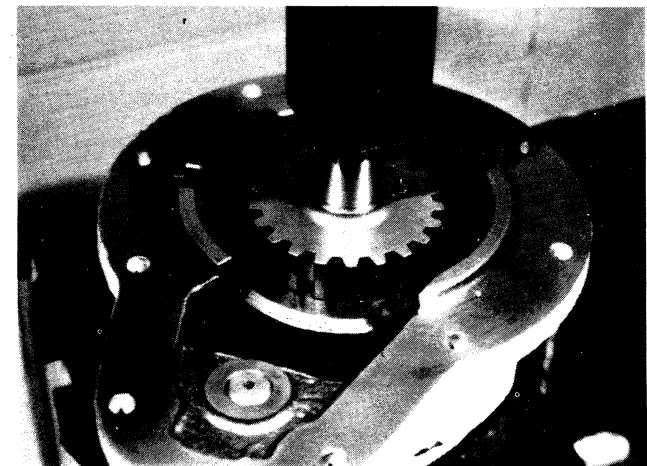


15. Assemble "O" ring onto cylinder cover.



16. Place cover on shift fork shaft and insert into cylinder. Secure in place with three (3) washers and (3) bolts. Torque to 25-30 ft. lbs.

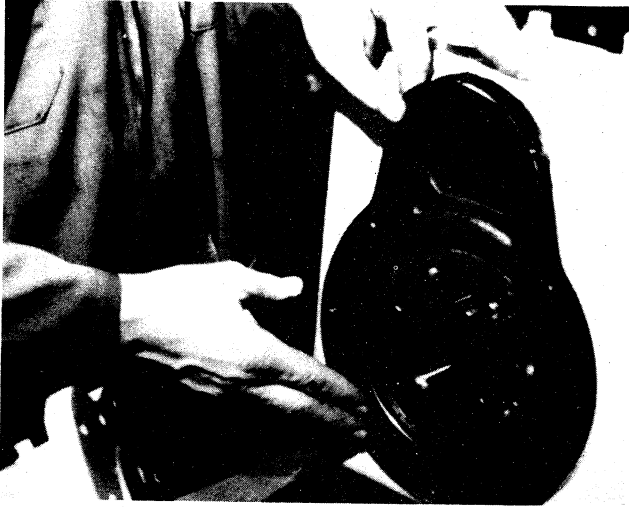
17. Install gasket and indicator switch assembly. Torque to 35-40 ft. lbs.



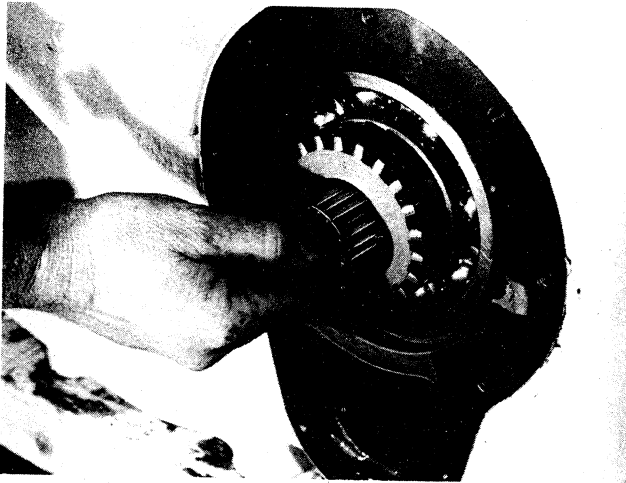
18. Turn disconnect assembly over and install disconnect shaft. Make sure shaft turns freely.

19. Install drain plug.

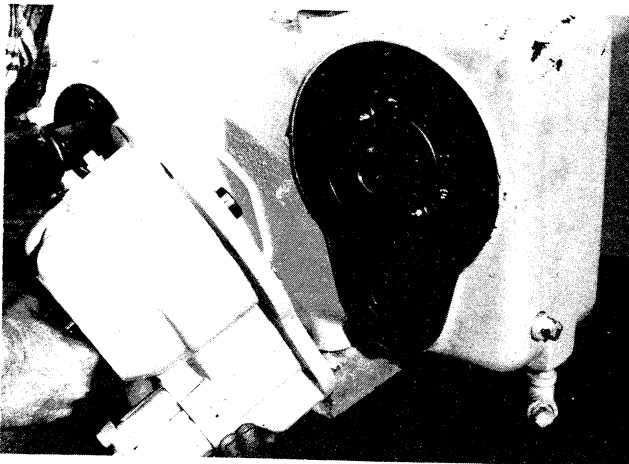
20. Unit is ready for installation onto transfer case.



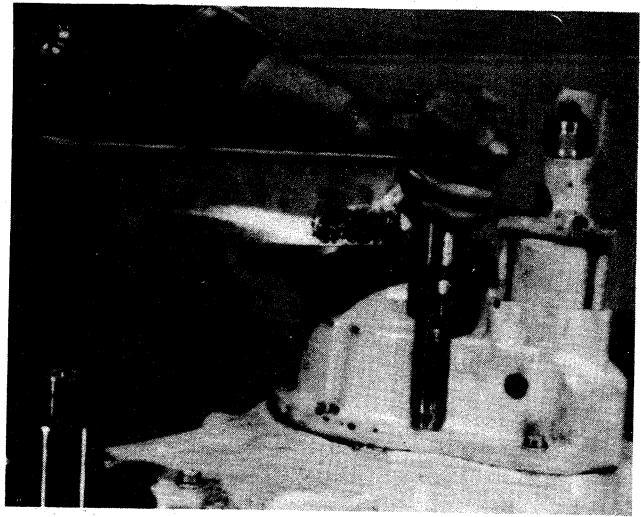
21. Position gasket onto housing, aligning bolt holes and oil groove.



22. Install needle roller bearing in shaft.

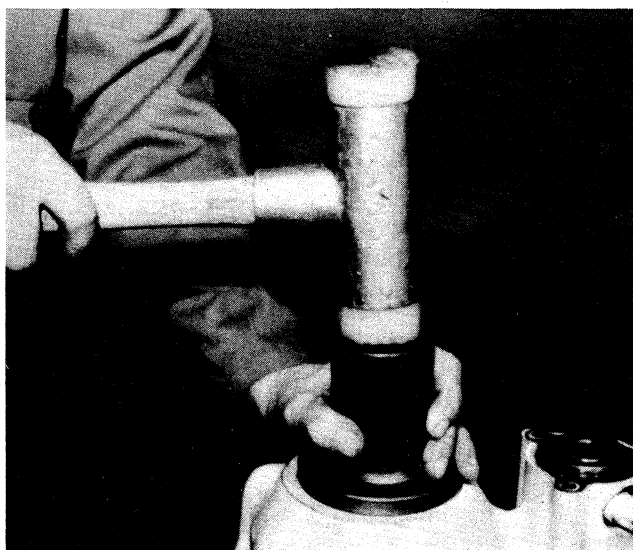
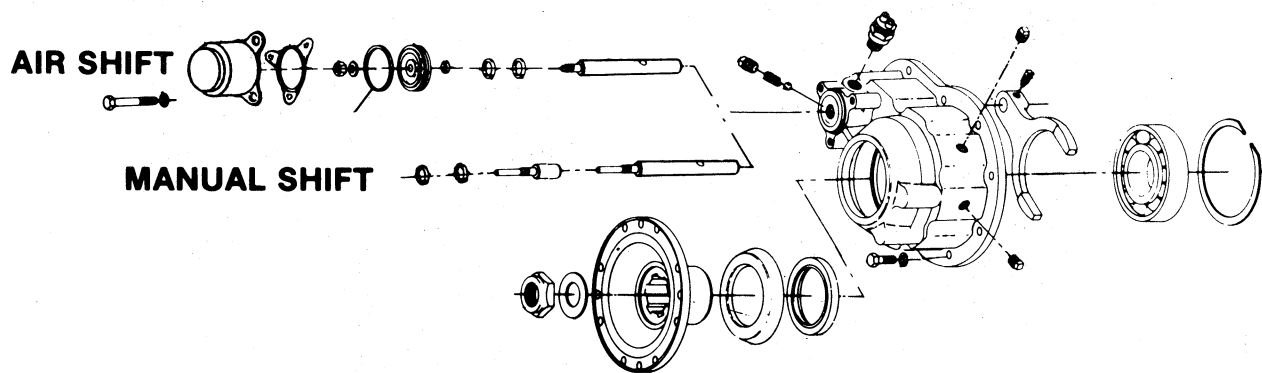


23. Position shift unit on housing and secure in place with nine (9) bolts and (9) lockwashers.



24. Torque bolts to 35-40 ft. lbs.

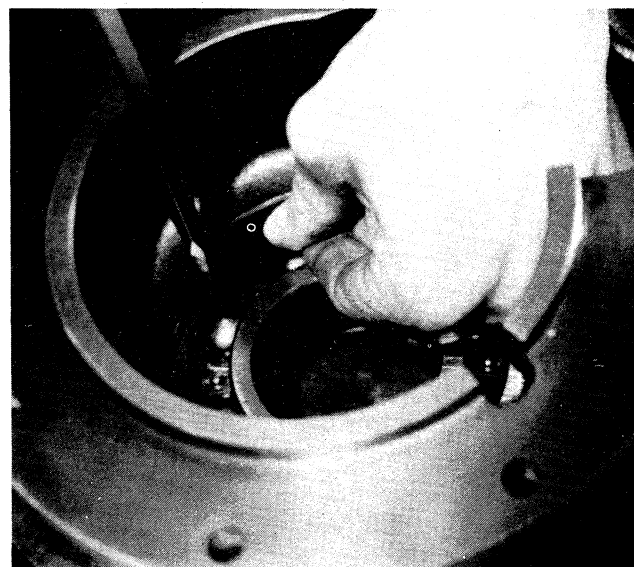
## Assembly Of Air Engaged — Air Disengaged Disconnect And Manual Shift Late Design



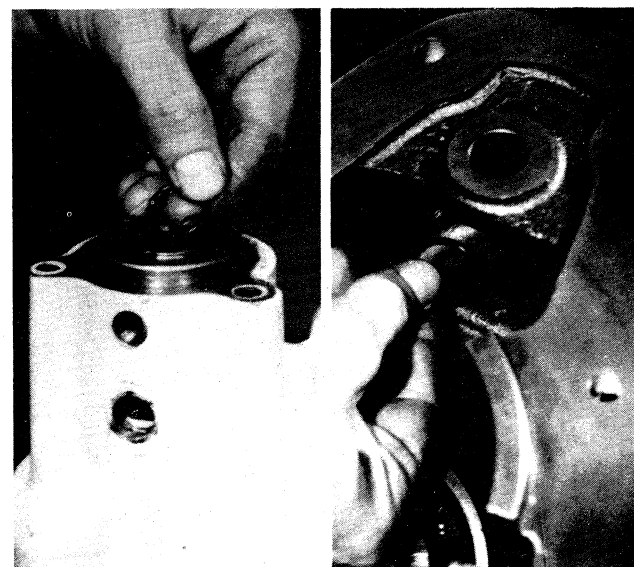
1. Put a light coat of lubricant on the output seal lip and use driver and soft hammer to install seal.



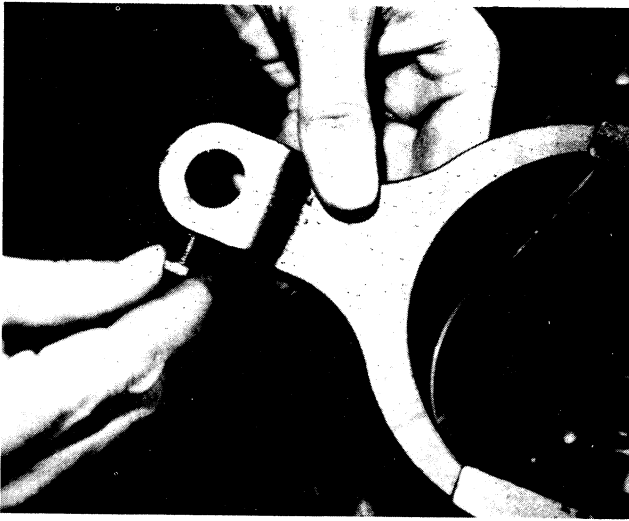
2. Turn disconnect housing over. Use a driver and soft hammer to install output shaft bearing.



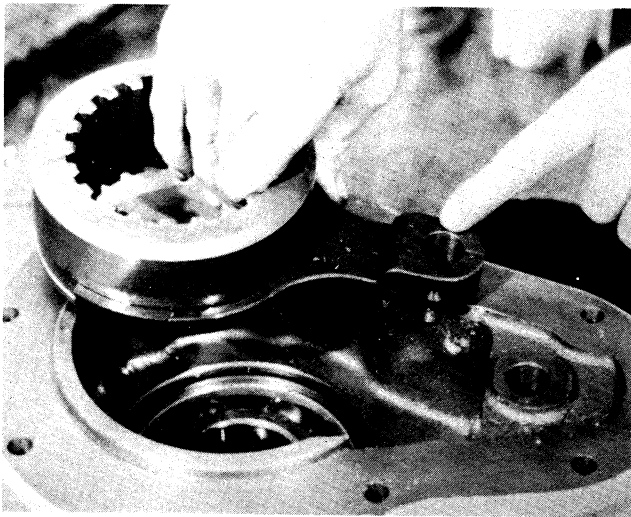
3. Use a common blade screwdriver to install bearing retainer snap ring.



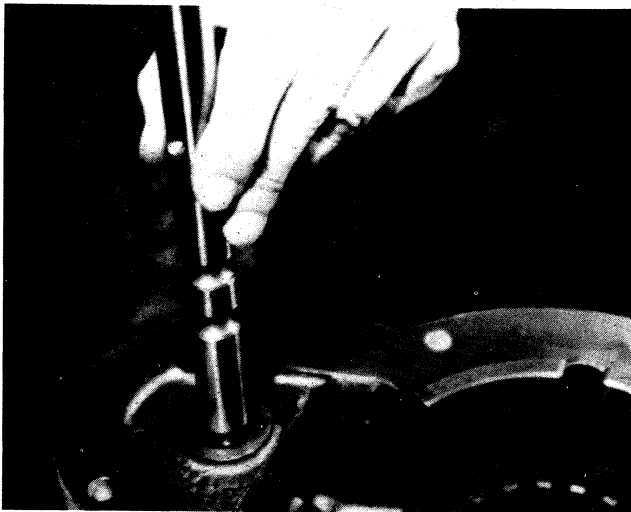
4. Install shift fork shaft "O" Rings into disconnect housing.



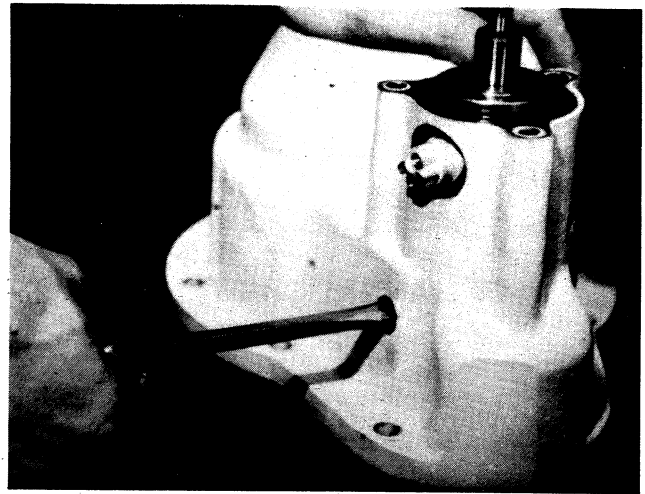
5. Partially install set screw into shift fork.



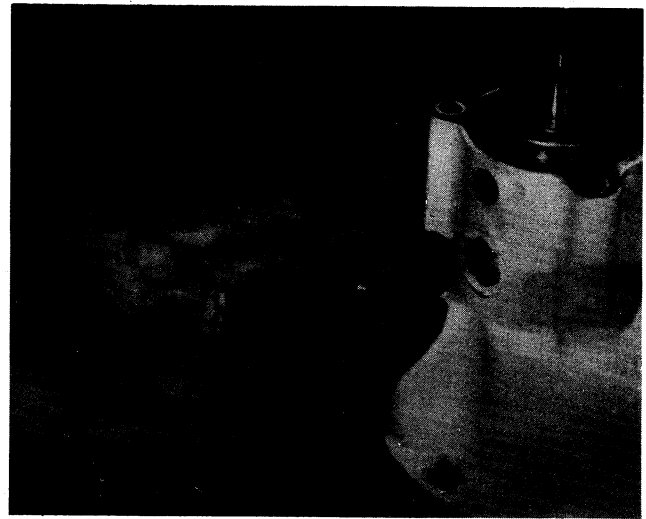
6. Place clutch collar onto shift fork, long side up and install into disconnect housing. Be sure boss on shift fork is facing up.



7. Install shift fork shaft into housing shaft. Align pilot with set screw

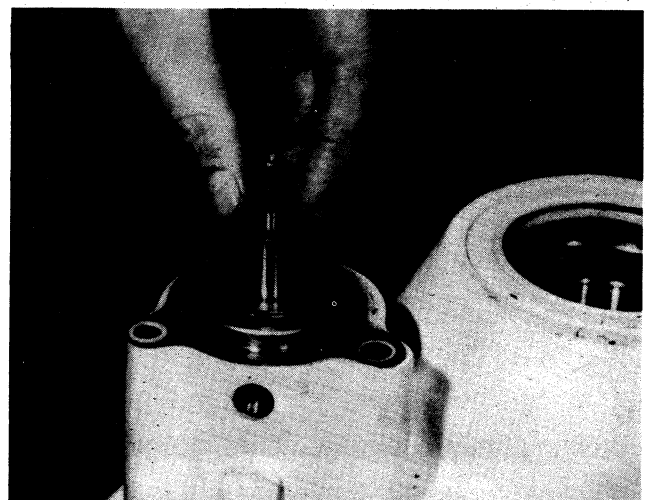


8. Tighten set screw and install and tighten square head plug.



9. Align groove on shift fork shaft with poppet. Install poppet ball, spring and hex head plug.

10. Install indicator switch torque switch to 40-50 ft-lbs.



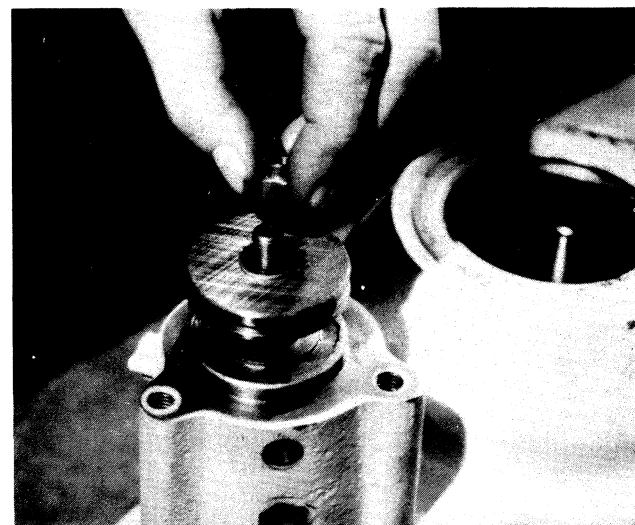
11. Install small "O" Ring onto shift fork shaft.



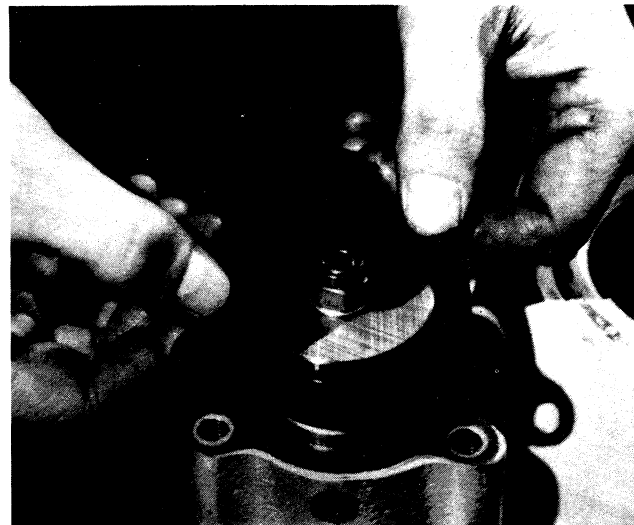
12. Assemble new "O" Ring onto piston.



13. Place piston onto shift fork shaft. Be sure counter bore on piston is down or faces small "O" Ring.



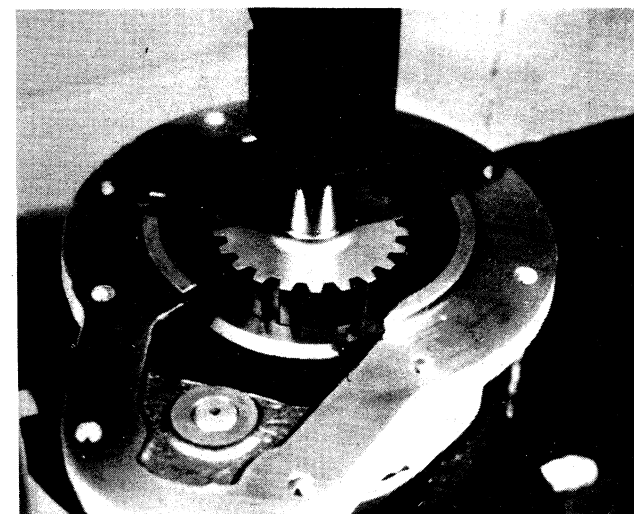
14. Place brass washer and locknut onto shift fork shaft. Torque nut to 18-25 ft-lbs.



15. Place air cylinder gasket onto disconnect housing.



16. Assemble cylinder onto housing, install (3) three hex head bolts and lockwashers. Torque bolts to 25-30 ft. lbs.



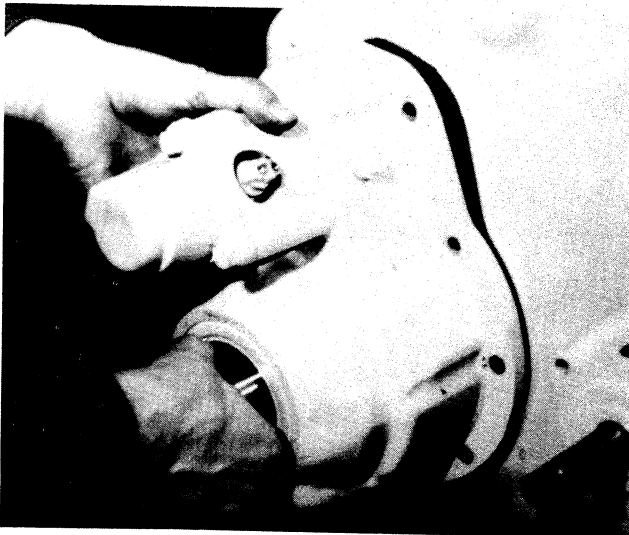
17. Place disconnect assembly onto press and install output shaft.



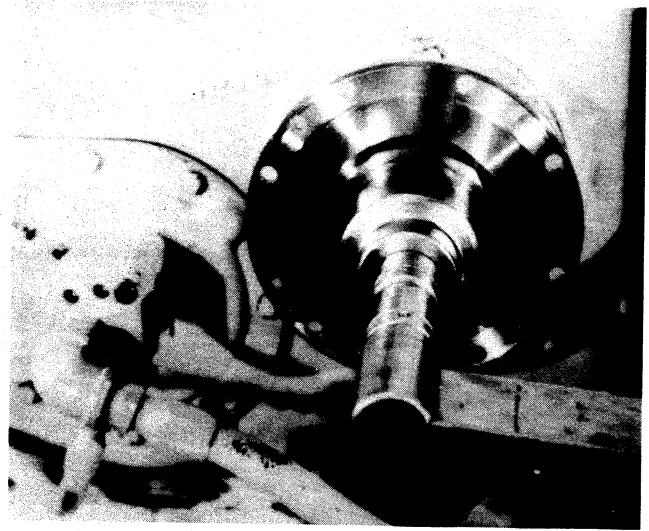
18. Position gasket onto transfer case housing. Be sure to align oil grooves.



19. Install needle roller bearings into output shaft.



20. Assemble disconnect assembly onto transfer case housing. Install (9) nine hex head bolts and lockwashers. Torque to 35-50 ft-lbs.



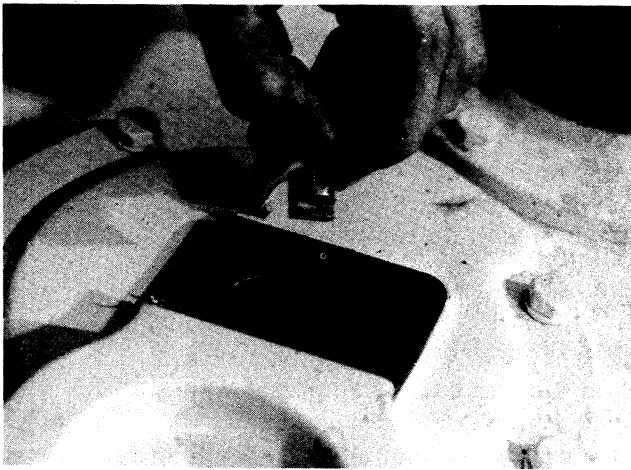
21. Install end yoke or companion flange. Secure with washer and new self-locking nut. Torque to 430 ft. lbs.

## LUBRICATION PUMP

### Assembling onto Transfer Case



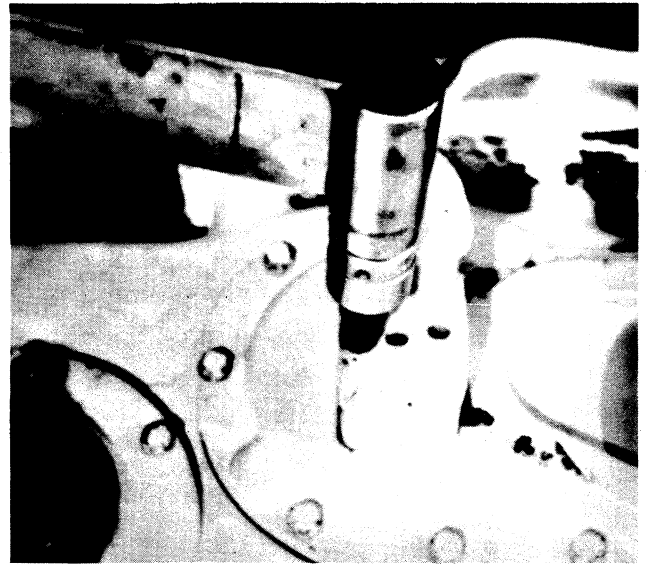
1. Make sure drive screw has been installed into intermediate shaft.



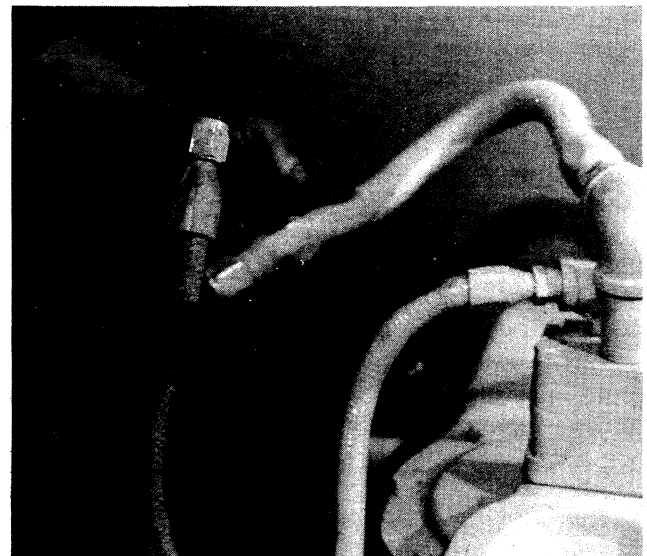
2. Install coupling into drivescrew.



3. Place new gaskets on housing, aligning bolt holes and coupling hole.

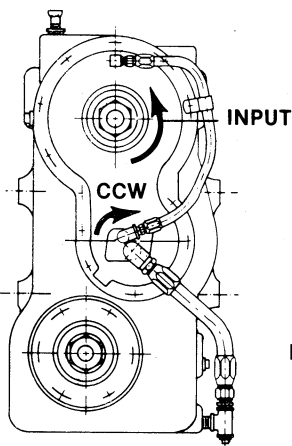


4. Align pump coupling and install lubrication pump on housing. Secure in place with two (2) cap bolts and torque to 14-16 ft. lbs.

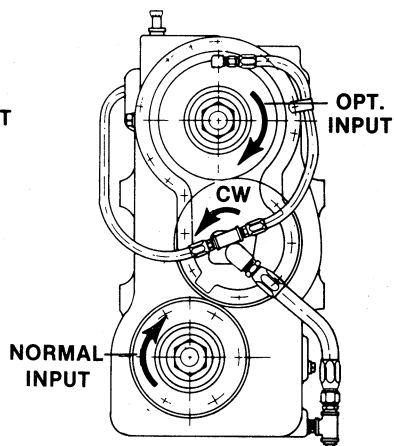


5. Connect hose assemblies.

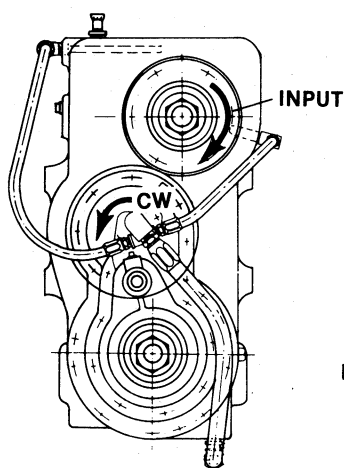
## IDENTIFICATION OF LUBE PUMP ROTATION



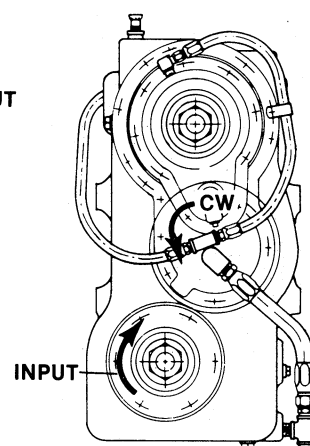
Models 738/738-A  
REAR VIEW



Model 784  
FRONT VIEW



Models 785/791  
FRONT VIEW



Model 792  
FRONT VIEW

There are two different lube pumps for the 738 family of transfer cases. Part number 378889-1 is clockwise input and 378853-1 is for counter-clockwise input. **This rotation specification is for the lube pump and is not necessarily the input rotation of the transfer case.**

When the transfer case is mounted normally (as shown above) the 738A, B, C, D, & E will need a "G" (CCW) pump and all others will require an "F" (CW) pump. **This rotation is determined by looking in at the lube pump input shaft.** When any of the transfer cases are turned around or upside-down or both, **the rotation of the lube pump specified in the model number is always for the lube pump when looking in at its input shaft.**

The lube pump is optional on the 738A, B, C, D, & E versions. The need for this option arises during prolonged low input R.P.M. to the transfer case. A typical use is a concrete mixer

pouring concrete into a curbing form while creeping along. Splash lubrication is adequate down to 1000 R.P.M. input to the transfer case while the lube pump adaption allows 300 R.P.M. prolonged input. The lube pump is standard on the 784, 785, 791, & 792 since these models function with the vehicle stationary. Stationary cooling is normally adequate to 250 HP with the lube pump.

### LUBE PUMP OPERATION

If the transfer case is equipped with a lube pump, loosen the hydraulic line(s) and run the transfer case momentarily to check for oil flow. Retighten lines after check.

### PREDELIVERY CHECKOUT

Run transfer case through its operating speeds to check for oil leaks, vibrations, noise, heat, etc. This should be done with the vehicle stationary, if possible.



**For more information, contact:**

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**APPLICATION POLICY**

Capability ratings, features and specifications vary depending upon model, type of application and type of service. Application approvals must be obtained from Spicer. Spicer specifications are subject to change without notice.

## APPENDIX A

## MAINTENANCE ALLOCATION CHART (MAC)

## Section I. INTRODUCTION

**A-1 THE ARMY MAINTENANCE SYSTEM MAC.**

a. This introduction (Section I) provides a general explanation of all maintenance and repair functions authorized at various maintenance levels under the standard Army Maintenance System concept.

b. The Maintenance Allocation Chart (MAC) in Section II designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or components will be consistent with the capacities and capabilities of the designated maintenance levels, which are shown in the MAC in column (4) as:

Unit - includes two subcolumns: C (operator/crew) and O (unit) maintenance.

Direct Support - includes an F subcolumn.

General Support - includes an H subcolumn.

Depot - includes a D subcolumn.

c. Section III lists the tools and test equipment (both special tools and common tools sets) required for each maintenance function referenced from Section II.

d. Section IV contains supplemental instructions and explanatory notes for a particular maintenance function as referenced from Section II.

**A-2 MAINTENANCE FUNCTIONS.** Maintenance functions will be limited to and defined as follows:

a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (i.e., by sight, sound, or feel).

b. Test. To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean (includes decontamination, when required), to replace filters, to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases.

d. Adjust. To maintain or regulate, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.

e. Align. To adjust specified variable elements of an item to bring about optimum or desired performance.

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test, measuring, and diagnostic equipment used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

g. Remove/Install. To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

h. Replace. To remove an unserviceable item and install a serviceable counterpart in its place. Replace is authorized by the MAC and is shown as the 3rd position code of the SMR code.

i. Repair. The application of maintenance services<sup>1</sup> including fault location/troubleshooting<sup>2</sup>, removal/installation, and disassembly/assembly<sup>3</sup> procedures, and maintenance actions<sup>4</sup> to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), and item, or system.

j. Overhaul. That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications (i.e., DMWR). Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

k. Rebuild. Consists of those service/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of material maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours, miles, etc.) considered in classifying Army equipment and components.

### A-3 EXPLANATION OF COLUMNS IN THE MAC, SECTION II.

a. Column 1 - Group Number. Column 1 lists functional group code numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the next higher assembly.

b. Column 2 - Component/Assembly. Column 2 contains the names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column 3 - Maintenance Function. Column 3 lists the functions to be performed on the item listed in column 2. (For detailed explanation of these functions, see paragraph A-2.)

d. Column 4 - Maintenance Category. Column 4 specifies, by the listing of a work time figure in the appropriate subcolumn(s), the category of maintenance authorized to perform the function listed in Column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function varies at different maintenance categories, appropriate work time figures will be shown for each category. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time (including any necessary disassembly/assembly time), troubleshooting/fault location time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the

---

<sup>1</sup>Service - Inspect, test, service, adjust, align, calibrate, and/or replace.

<sup>2</sup>Fault location/troubleshooting - The process of investigating and detecting the cause of equipment malfunctioning; the act of isolating a fault within a system or unit under test (UUT).

<sup>3</sup>Disassembly/assembly - The step-by-step breakdown (taking apart) of a spare/functional group coded item to the level of its least component, that is assigned an SMR code for the level of maintenance under consideration (i.e., identification as maintenance significant).

<sup>4</sup>Actions - Welding, grinding, riveting, straightening, facing, machining, and/or resurfacing.

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maintenance functions authorized in the maintenance allocation chart. The symbol designations for the various maintenance categories are as follows:

- C Operator or Crew
- O Unit Maintenance
- F Direct Support Maintenance (DS)
- H General Support Maintenance (GS)
- D Depot Maintenance

e. Column 5 - Tools and Equipment. Column 5 specifies, by number code, those common tool sets (not individual tools) and special tools; Test, Measurement, and Diagnostic Equipment (TMDE); and support equipment required to perform the designated function, which shall be keyed to the tools listed in Section III.

f. Column 6 - Remarks. This column shall, when applicable, contain a letter code, in alphabetic order, which shall be keyed to the remarks contained in Section IV.

#### **A-4 EXPLANATION OF COLUMNS IN TOOL AND TEST EQUIPMENT REQUIREMENTS, SECTION III.**

a. Column 1 - Reference Code. The tool and test equipment reference code correlates with a number code used in the MAC, Section II, Column 5.

b. Column 2 - Maintenance Category. The lowest category of maintenance authorized to use the tool or test equipment.

c. Column 3 - Nomenclature. Name or identification of the tool or test equipment.

d. Column 4 - National Stock Number. The National stock number (NSN) of the tool or test equipment.

e. Column 5 - Tool Number. The manufacturer's part number.

#### **A-5 EXPLANATION OF COLUMNS IN REMARKS, SECTION IV.**

a. Column 1 - Reference Code. The letter code recorded in Column 6, Section II.

b. Column 2 - Remarks. This column lists information pertinent to the maintenance function being performed as indicated in the MAC, Section II.

**Section II. MAINTENANCE ALLOCATION CHART  
FOR  
MODULAR CAUSEWAY FERRY (MCF)**

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
0	Modular Causeway Ferry (MCF)	INSPECT SERVICE	2.0 2.0	6.0 6.0	2.0 2.0	4.0		1-11 1-12	C F
01	Powered Section Assembly	INSPECT SERVICE TEST	2.0 2.0 0.5	2.0				1-11 1-12	C F
0101	P40P Propulsion Module Assembly	INSPECT SERVICE REPAIR TEST	4.0 8.0 2.0 0.5			4.0		1-11 1-13 1-13	C, G A, C, E, F C, G
010101	Engine Cooling System Install.	INSPECT REPLACE REPAIR TEST	0.5 0.5 0.5 0.5	1.5 1.5					C, G
01010101	Duplex Strainer	SERVICE REPAIR REPLACE ADJUST		1.5 1.0 0.5	1.0			11 12 12 12	C B
010102	Drive Train Installation	INSPECT SERVICE REPLACE REPAIR ALIGN	1.0 0.5	1.5 0.5	1.0 2.0	2.0			C, G C, G C, G C, G
01010201	Diesel Engine	INSPECT SERVICE REPLACE REPAIR TEST ADJUST	1.5 1.0 10.0 1.0 2.0	1.0 2.0 10.0 2.0	2.0 8.0 24.0 1.0			11 1-12 12 11	C C H H
0101020101	Cylinder Block Group	REPLACE REPAIR				4.0 4.0		12 12	I, K I, K
010102010101	Block Assembly	REPLACE REPAIR				4.0 6.2		12 12	I, K I, K
010102010102	Plate Assembly	REPLACE REPAIR				2.0 4.0		12 12	I, K I, K
010102010103	Plate Assembly	REPLACE REPAIR				2.0 4.0		12 12	I, K I, K
0101020102	Air Box Drains Group	REPLACE REPAIR		1.0 1.4				12 12	K K
0101020103	Cylinder Head Group	INSPECT REPLACE REPAIR			0.6 8.0	2.1		12 12	B, K K

**Section II. MAINTENANCE ALLOCATION CHART  
FOR  
MODULAR CAUSEWAY FERRY (MCF)**

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
010102010301	Cylinder Head Assembly	REPLACE REPAIR			4.0	10.0		12 12	I, K I, K
0101020104	Engine Lifter Brackets Group	REPLACE REPAIR			0.5 0.5			12 12	K K
0101020105	Crankshaft and Stabilizers Group	REPLACE REPAIR				1.5 5.6		12 12	I, K I, K
010102010501	Crank Assembly	REPLACE REPAIR				1.0 10.0		12 12	I, K I, K
0101020106	Vibration Damper Group	REPLACE REPAIR			1.0 2.6			12 12	K K
010102010601	Hub Assembly	REPLACE REPAIR			0.5 1.0			12 12	I, K I, K
0101020107	Crankshaft Pulley Group	REPLACE REPAIR			1.0 1.0			12 12	K K
0101020108	Flywheel Housing Group	REPLACE REPAIR				0.5 2.0		12 12	K K
0101020109	Flywheel Group	REPLACE REPAIR				1.0 4.0		12 12	K K
010102010901	Flywheel Assembly	REPLACE REPAIR				4.0 4.0		12 12	I, K I, K
0101020110	Connecting Rod and Piston Group	REPLACE REPAIR				4.0 4.0		12 12	K K
010102011001	Rod Assembly	REPLACE REPAIR				2.0 2.0		12 12	I, K I, K
0101020111	Camshaft and Gear Train Group	REPLACE REPAIR				7.0 8.0		12 12	K K
010102011101	Hub Assembly	REPLACE REPAIR				2.0 2.0		12 12	I, K I, K
0101020112	Balance Weight Cover Group	REPLACE REPAIR				1.0 1.0		12 12	K K
010102011201	Cover Assembly	REPLACE REPAIR				0.5 0.5		12 12	I, K I, K
0101020113	Valve and Injector Operator Group	REPLACE REPAIR				1.4 1.6		12 12	K K
010102011301	Shaft Assembly	REPLACE REPAIR				0.5 0.5		12 12	I, K I, K
010102011302	Left Arm Assembly	REPLACE REPAIR				0.5 0.5		12 12	I, K I, K

**Section II. MAINTENANCE ALLOCATION CHART  
FOR  
MODULAR CAUSEWAY FERRY (MCF)**

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
010102011303	Right Arm Assembly	REPLACE REPAIR				0.5 0.5		12 12	I, K I, K
010102011304	Clevis Arm Assembly	REPLACE REPAIR				0.5 0.5		12 12	I, K I, K
0101020114	Rocker Cover Group	REPLACE REPAIR			0.5 0.5			12 12	K K
0101020115	Fuel injector/Change Controls Group	REPLACE REPAIR				1.6 2.2		12 12	K K
0101020117	Fuel Pump Group	REPLACE REPAIR				0.5 1.7		12 12	K K
010102011701	Pump Assembly	REPLACE REPAIR				1.0 1.0		12 12	I, K I, K
0101020118	Fuel Filter Mounting Group	REPLACE REPAIR		0.4 0.4				12	K
0101020119	Fuel Manifold and Connections Group	REPLACE REPAIR				0.4 0.8		12 12	K K
010102011901	Pipe Assembly	REPLACE REPAIR				0.5 0.5		12 12	I, K I, K
010102011902	Pipe Assembly	REPLACE REPAIR				0.5 0.5		12	I, K
0101020120	Fuel Lines Filter and Cooler Group	REPLACE REPAIR		1.0 1.8				12 12	K K
010102012001	Fuel/Water Separator	SERVICE REPLACE REPAIR		0.5 1.0 1.0				12 12	I, K I, K
0101020121	Electric Governor Group	REPLACE REPAIR ADJUST			1.0 1.5 0.5			12 12 12	K K K
010102012101	Housing Assembly	REPLACE REPAIR			0.3 0.3			12 12	I, K I, K
0101020122	Injector Controls Group	REPLACE REPAIR			1.5 3.0			12 12	K K
010102012201	Lever Assembly	REPLACE REPAIR			0.5 0.5			12 12	I, K I, K
010102012202	Modulator Assembly	REPLACE REPAIR			0.5 0.5			12 12	I, K I, K
0101020123	Air Inlet Housing Group	SERVICE REPLACE REPAIR			1.5 1.5 1.5			12 12 12	K K K

**Section II. MAINTENANCE ALLOCATION CHART  
FOR  
MODULAR CAUSEWAY FERRY (MCF)**

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
010102012301	Housing Assembly	REPLACE REPAIR			1.5 1.5			12 12	I, K I, K
0101020124	Blower and Drive Group	REPLACE REPAIR			2.0 2.0			12 12	K K
010102012401	Blower Assembly	REPLACE REPAIR			2.0 2.0			12	I, K
010102012402	Rotor Assembly	REPLACE REPAIR			2.0 2.0			12 12	I, K I, K
010102012403	Rotor Assembly	REPLACE REPAIR			2.0 2.0			12 12	I, K I, K
010102012404	Plate Assembly	REPLACE REPAIR			2.0 2.0			12 12	I, K I, K
01012012405	Plate Assembly	REPLACE REPAIR			2.0 2.0			12 12	I, K I, K
010102012406	Connector Assembly	REPLACE REPAIR			3.0 3.0			12 12	I, K I, K
0101020125	Blower Drive Shaft Group	REPLACE REPAIR			1.5 1.5			12 12	K K
0101020126	Turbocharger Group	REPLACE REPAIR			1.0	0.5		12 12	K K
010102012601	Aftercooler Assembly	REPLACE REPAIR				2.0 2.0		12	I, K
0101020127	Oil Pump Group	REPLACE REPAIR				1.5 3.0		12	K
010102012701	Pump Assembly	REPLACE REPAIR				1.0 1.0		12	I, K
0101020128	Oil Distribution System Group	REPLACE REPAIR				2.0 3.7		12	K
0101020129	Oil Pressure Regulator Group	REPLACE REPAIR				1.5 2.1		12	K
010102012901	Regulator Assembly	REPLACE REPAIR				1.0 1.0		12	I, K
010102012902	Valve Assembly	REPLACE REPAIR				1.0 1.0		12	I, K
0101020130	Oil Filter Group	REPLACE REPAIR		0.5 0.5				12	K
0101020131	Oil Cooler and Marine Gear Lines Group	REPLACE REPAIR			2.5 1.5			12	K

**Section II. MAINTENANCE ALLOCATION CHART  
FOR  
MODULAR CAUSEWAY FERRY (MCF)**

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
0101020132	Oil Filter Group	REPLACE REPAIR		1.0 1.5				12	K
0101020133	Dipstick Group	REPLACE REPAIR		0.5 0.5				12	K
0101020134	Oil Pan Group	REPLACE REPAIR				0.5 2.0		12	K
0101020135	Ventilation System Group	REPLACE REPAIR			1.5 2.0			12	K
010102013501	Collector Assembly	REPLACE REPAIR			1.0 2.5			12	I, K
010102013502	Collector Assembly	REPLACE REPAIR			1.0 2.5			12	I, K
0101020136	Fresh Water Pump Group	REPLACE REPAIR			1.5 3.0			11 12	B K
010102013601	Pump	REPLACE REPAIR			1.0 1.0			12	I, K
0101020137	Manifold Water Outlet Group	SERVICE REPLACE REPAIR		1.1 1.5 2.0				12 12	K K
0101020138	Thermostat Group	REPLACE REPAIR			1.0 2.0			11	K
0101020139	Water Bypass Tube Group	REPLACE REPAIR		0.5 1.0				12	K
0101020140	Water Connection Group	REPLACE REPAIR				2.5 2.5		12	B
0101020141	Heat Exchanger Group	INSPECT SERVICE REPLACE REPAIR		2.0 2.5				12 12	K K
010102014101	Electrode Assembly	REPLACE REPAIR			2.5 3.5			12	B
0101020142	Raw Water Pump Group	SERVICE REPAIR REPLACE		0.5	0.5 2.1			12	I, K
010102014201	Pump Assembly	REPLACE REPAIR				3.0		11 12	B, K
0101020143	Water Filter Group	SERVICE REPLACE REPAIR		0.75 0.4 0.4	1.5			12	K
0101020144	Exhaust Manifold Connections Group	REPLACE REPAIR			1.0 4.0			12	K

**Section II. MAINTENANCE ALLOCATION CHART  
FOR  
MODULAR CAUSEWAY FERRY (MCF)**

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
0101020145	Exhaust Muffler Connections Group	REPLACE REPAIR		0.5 0.5				12	B
0101020146	Starting Motor Group	REPLACE REPAIR		0.5 1.9				12	
0101020147	Tachometer Drive Group	REPLACE REPAIR		2.0 2.0				12	B
0101020148	Alarm System Group	REPLACE REPAIR			1.0 3.5			12	K
0101020149	Overspeed Governor Group	ADJUST REPLACE REPAIR			1.0 2.0 2.0			12 12 12	K K K
0101020150	Instruments Sending Units Group	REPLACE REPAIR			0.5 1.1			12	K
0101020151	Pushbutton Group	REPLACE REPAIR			0.5 1.0			12	B, K
0101020152	Heater Connections Group	REPLACE REPAIR		1.0 2.0				12	K
0101020153	Alternator and Bracket Group	TEST REPLACE REPAIR ADJUST		0.5 1.0 2.0 0.5				12 12 12 12	K K B K
0101020154	Wire Harness Group	REPLACE REPAIR				2.0 1.0		12	K
0101020155	Cold Pac Starting Aid Group	INSPECT SERVICE REPLACE REPAIR		0.1 0.5 1.5 0.5				12 12 12 12	
010102015501	Cold Pac Assembly	REPLACE REPAIR		1.5 0.5				12	
0101020156	Fuel Priming Pump Group	REPLACE REPAIR		1.0 1.0				12	B, K
0101020157	Marine Gear	INSPECT SERVICE ADJUST REPLACE REPAIR ALIGN	0.5	0.5 1.0	1.0 6.0 2.0	6.0		12	B, I, K  I
010102015701	Electric Control Valve	REPAIR REPLACE				3.0 3.0			
01010202	Transfer Case	INSPECT SERVICE REPLACE REPAIR	0.5	0.5 1.0	2.0	4.0		11 11 12	C, F, K

**Section II. MAINTENANCE ALLOCATION CHART  
FOR  
MODULAR CAUSEWAY FERRY (MCF)**

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
01010203	Pump-Jet	INSPECT SERVICE REPAIR REPLACE	0.5 1.0	0.5 1.5 0.5				11 11 12 12	C, F C, H
0101020301	Upper Gear Box	REPLACE REPAIR				3.0 3.0			
0101020302	Hydro-Motor	REPLACE REPAIR			2.0	3.0			
0101020303	Planetary Gearing	REPLACE REPAIR			2.0	3.0			
0101020304	Feed Back Unit	REPLACE REPAIR SERVICE			0.5 0.5	1.0 0.5			
0101020305	Planetary Gearing	REPLACE REPAIR			2.0	3.0			
01010204	Fast Lube Oil Change System	REPLACE REPAIR		0.5 0.5					
01010205	Tank Assembly	REPLACE REPAIR		0.5 0.5					B
010103	Machinery Guard Installation	REPLACE REPAIR		0.5 0.5				12	B
010104	Engine Exhaust System Installation	REPLACE REPAIR SERVICE	0.25	4.0 2.0				11	
01010401	Muffler Assembly	REPAIR REPLACE		0.5 0.5					
01010402	Thru Hull Assembly	REPAIR REPLACE		0.5 0.5					
01010403	Retainer Assembly	REPAIR REPLACE		0.5 0.5					
010105	Hydraulic System Installation	INSPECT SERVICE REPLACE REPAIR ADJUST	1.0	3.0 6.0 4.0 1.0 1.0				11 11 12 12	C C, D, G B
01010501	Hydro-Pump Installation	REPLACE REPAIR ADJUST		1.0 1.0 1.0					
0101050101	Pump	REPLACE REPAIR		1.0		4.0			
01010502	Valve Unit	REPLACE REPAIR		1.0 1.0					

**Section II. MAINTENANCE ALLOCATION CHART  
FOR  
MODULAR CAUSEWAY FERRY (MCF)**

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
0101050201	Valve	REPLACE REPAIR		1.0		2.5			
01010503	Hydro-Handpump Installation	REPLACE REPAIR SERVICE INSPECT	0.2	1.0 1.0 0.2					
0101050301	Handpump	REPLACE REPAIR		1.0 1.0					
01010504	Ball Valve	REPLACE REPAIR		0.5 0.5					
01010505	Hydraulic Reservoir Assembly	REPLACE REPAIR		2.0 2.0					
0101050501	Return Filter Assembly	REPAIR REPLACE		0.5 0.5					
0101050502	Inspection Cover	REPAIR REPLACE		0.5 0.5					
010106	Bilge System Installation	INSPECT REPLACE REPAIR TEST	1.0  0.1	2.0 3.0				11 11 12	C, G B
010107	Fire Suppression System	INSPECT SERVICE REPLACE REPAIR TEST INSTALL	0.25	1.0 1.0 0.5 1.0		1.0			A
010108	Fuel System	INSPECT SERVICE REPLACE REPAIR	0.5 0.5	1.0 1.0 2.5				12 11	C, G
010109	Propulsion Module Electrical Assembly	INSPECT REPAIR REPLACE TEST	0.5  0.5	2.0 2.0				12	B
01010901	Bilge Pump Control Assembly A5	INSPECT REPLACE REPAIR		0.25 2.0 1.5					B
01010902	Single Bilge Pump Control Assembly A7	INSPECT REPLACE REPAIR		0.25 2.0 1.5					B
01010903	Engine Junction Box Assembly A4	INSPECT REPLACE REPAIR		0.25 2.0 1.5					B

**Section II. MAINTENANCE ALLOCATION CHART  
FOR  
MODULAR CAUSEWAY FERRY (MCF)**

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
01010904	Propulsion Module Junction Box A3	INSPECT REPLACE REPAIR		0.25 2.0 1.5					B
01010905	Circuit Breaker Panel Assembly A6	INSPECT REPAIR REPLACE		0.25 1.5 2.0					B
01010906	Battery Installation	INSPECT SERVICE REPLACE REPAIR	0.5 1.5	0.5 0.5 1.5				11 11	C, G F B
01010907	Vent Fan Relay Enclosure Assembly	INSPECT REPLACE REPAIR		0.25 2.0 1.5					B
01010908	Pump-Jet Junction Box Assembly A2	INSPECT REPLACE REPAIR		0.25 2.0 1.5					
01010909	Pump-Jet Dir/Aux Battery Junction Box A9	INSPECT REPLACE REPAIR		0.25 2.0 1.5					
010110	Emergency Steering System	INSPECT SERVICE REPLACE REPAIR	0.5 0.5	0.5 2.5				12	C, G B
0102	P40 Pontoon Assembly	INSPECT REPLACE REPAIR TEST ADJUST	0.5	0.5 0.5 0.5 1.0			*	1-11, 13	A, B
0103	P20LR Pontoon Assembly	INSPECT REPLACE REPAIR TEST ADJUST	0.5	0.5 0.5 0.5 0.5			*	1-11, 13	A, B
010301	Hatch Assembly	REPAIR REPLACE	0.5 0.5						
0104	P20CR Pontoon Assembly	INSPECT REPLACE REPAIR TEST ADJUST	0.5	0.5 0.5 0.5 0.5			*	1-11, 13	A, B
0105	P20RR Pontoon Assembly	INSPECT REPLACE REPAIR TEST ADJUST	0.5	0.5 0.5 0.5 0.5			*	1-11, 13	A, B

**Section II. MAINTENANCE ALLOCATION CHART  
FOR  
MODULAR CAUSEWAY FERRY (MCF)**

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL				(5) TOOLS AND EQUIPMENT	(6) REMARKS
			UNIT		DS	GS		
			C	O	F	H	D	
010501	Hatch Assembly	REPAIR REPLACE		0.5 0.5				
0106	Operator's Cab	INSPECT SERVICE REPLACE REPAIR	1.5 1.5	1.0 2.5				B
010601	Middle Control Panel A1	INSPECT REPLACE REPAIR	0.5	0.75 0.5 2.0				C, G B
01060101	Indicating Device	REPLACE REPAIR		0.5 0.5				
010602	Lower Control Panel A2	INSPECT REPLACE REPAIR	0.5	0.75 0.5 2.0				C, G B
010603	Operator's Cab Circuit Breaker Panel A3	INSPECT REPLACE REPAIR		0.25 2.0 1.5				C, G B
010604	Terminal Strip Assembly A4	INSPECT REPLACE REPAIR		0.5 2.0 1.5				C, G B
010605	Stbd Receptacle Assembly A5	INSPECT REPLACE REPAIR		0.5 2.0 1.5				C, G B
010606	Port Receptacle Assembly A6	INSPECT REPLACE REPAIR		0.5 2.0 1.5				C, G B
010607	Spotlight	SERVICE REPLACE REPAIR ADJUST		0.2 1.0 2.0 0.2				12 12 12
010608	Junction Box Assembly	INSPECT REPAIR REPLACE		0.5 2.0 1.5				C, G B
010609	Mast Enclosure Assembly	INSPECT REPLACE REPAIR		0.5 2.0 1.5				
0107	Intake Plenum Assembly	INSPECT REPAIR REPLACE	0.2	0.5 0.5				11-13 A
0108	Fender Assembly	REPLACE REPAIR		0.25 0.5				B
0109	Mooring Cleat Assembly	REPLACE REPAIR		0.25 0.5				B

**Section II. MAINTENANCE ALLOCATION CHART  
FOR  
MODULAR CAUSEWAY FERRY (MCF)**

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL				(5) TOOLS AND EQUIPMENT	(6) REMARKS
			UNIT		DS	GS		
			C	O	F	H	D	
0110	Mooring D-Ring	REPLACE REPAIR		0.25 0.5				
0111	Exhaust Plenum Assembly	INSPECT REPLACE REPAIR SERVICE	0.2	0.5 1.0 0.25				11-13 B
0112	Stub Mast Navigation Assembly	INSPECT REPLACE REPAIR	0.2	0.2 0.5				C, G 2-13 F
011201	Stern Light	REPLACE REPAIR		0.5 1.5				
0113	Main Mast Navigation Assembly	INSPECT REPLACE REPAIR	0.2	1.0 1.0				13 B
011301	Navigation Lights Terminal Box	INSPECT REPAIR REPLACE		0.5 2.0 1.5				
011302	Navigation Light, Starboard	REPLACE REPAIR		1.0 1.5				
011303	Navigation Light, Port	REPLACE REPAIR		1.0 1.5				
011304	Navigation Light, Vessel Aground	REPLACE REPAIR		1.0 1.5				
011305	Navigation Light, Masthead	REPLACE REPAIR		1.0 1.5				
011306	Navigation Light, Anchor	REPLACE REPAIR		1.0 1.5				
011307	Single Task Light	REPLACE REPAIR		1.0 1.5				
0114	Module Electrical Interconnect Assembly	INSPECT REPLACE REPAIR		0.5 0.5		1.5		C, G B B
0115	Anchorboard Assembly	INSPECT SERVICE REPAIR REPLACE	0.5 0.5	2.0 1.0				1-10 C, G F
0116	Railing Installation	INSPECT REPLACE REPAIR	0.5	1.0 0.5				

**Section II. MAINTENANCE ALLOCATION CHART  
FOR  
MODULAR CAUSEWAY FERRY (MCF)**

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
0117	Spreader Assembly	INSPECT REPLACE REPAIR TEST SERVICE		0.5    0.5		   1.5 1.0	0.5 1.5  *	1-10 13	C, G F
02	MCF Intermediate Section Assembly	INSPECT	1.0					1-11	C, G
03	MCF Beach End Section	INSPECT	1.0					1-11	C, G
0301	P25B Beach/Sea End Module	INSPECT REPAIR REPLACE TEST ADJUST	0.5	0.5 0.5 0.5 0.25			*	13	A, B, E
030101	Rhino Horn Assembly	REPLACE REPAIR INSPECT		0.25 0.5 0.5				13	
04	P3 Module Assembly	INSPECT REPLACE REPAIR TEST SERVICE ADJUST	0.5	0.5 0.5 0.5 0.25 0.25					

**Section III. TOOLS AND TEST EQUIPMENT  
FOR  
MODULAR CAUSEWAY FERRY (MCF)**

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE LEVEL	NOMENCLATURE	NATIONAL STOCK NUMBER	TOOL NUMBER
1	C	Bar, Pry, Pinch, 60"	5120-00-224-1384	GGGB-101
2	C	Hammer, Hand, 10 LB	5120-00-251-4489	
3	C	Hammer, Hand, Scaling	5120-00-224-4111	
4	C	Corrosion Remover	1440-01-028-3063	A-29
5	C	Brush, Wire, Scratch	7920-00-291-5815	
6	C	Grease, General Purpose	9150-00-985-7316	MIL-G-23549
7	C	Wrench Set, Combination	5120-00-148-7917	GGG-W-636
8	C	Wrench, Adjustable, 12"	5120-00-264-3796	ANSI-B107-8
9	C	Socket, Thin Wall	5120-00-277-1465	53918
10	O	Tool Kit, Automotive	5180-00-177-7033	
11	O	Wrench, Strap	5120-00-776-1840	
12	O	Wrench, Monkey	5120-00-277-3020	
13	O	Tester, Battery Electrolyte Solution	6630-00-171-5126	GG-T-258
14	O	Tool Kit, Marine & Rail	5180-00-629-9783	
15	O	Flashlight, Regular, Two Cell	6230-00-163-1856	W-F-421
16	O	Fuse Puller and Tester	5120-00-319-3295	34-005
17	O	Multimeter	6625-00-004-9536	
18	O	Tester, Battery	6630-00-171-5126	
19	O	Wrench, Torque, 0-150 FT.LBS	5120-00-247-2540	
20	F	Tool Kit, Welder	5180-00-754-0661	
21	H	Wrench, Spanner		543-1-15X24-9
22	H	Wrench, Torque, 100-500 Ft.LBS	5120-00-542-5577	
23	H	Dial Indicator	5120-00-402-9619	J7872

**Section IV. REMARKS FOR  
MODULAR CAUSEWAY FERRY (MCF)**

REMARKS CODE	REMARKS
A	Repair beyond the capabilities of GS units will be performed on a case by case basis subject to funding and approval by the National Maintenance Point (NMP).
B	Repair of this item is by replacement.
C	Accomplish monthly or prior to use and before stowage.
D	Accomplish monthly or after exposure to severe weather (sea state 3) and operator mishandling.
E	Accomplish whenever craft is removed from water.
F	Service includes cleaning, painting, and surface preservation.
G	After every time MCF has accomplished a field/training operation.
H	After return from higher level maintenance.
I	Time does not include engine, Transfer Case, or Pump-Jet removal from MCF.
J	Accomplish in accordance with prescribed military technical manual procedures.
K	Accomplish in accordance with commercial manufacturer maintenance and repair procedures.



## APPENDIX B

COMPONENTS OF END ITEM/  
BASIC ISSUE ITEMS LIST (COEI/BIIL)

## Section I. INTRODUCTION

## B-1. SCOPE.

This appendix lists components of the end item and basic issue items for the Modular Causeway Ferry (MCF) to help you inventory the items for safe and efficient operation of the equipment.

## B-2. GENERAL.

The Components of End Item (COEI) and Basic Issue Items (BIIL) Lists are divided into the following sections:

a. Section II, Components of End Item. This listing is for information purposes only, and is not authority to requisition replacements. These items are part of the Modular Causeway Ferry (MCF). As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Items of the COEI are removed and separately packaged for transportation or shipment when necessary. Illustrations are furnished to help you find and identify the items.

b. Section III, Basic Issue Items. These essential items are required to place the Modular Causeway Ferry (MCF) in operation, operate it, and to do emergency repairs. Although shipped separately packaged, BIIL must be with the MCF during operation and when it is transferred between property accounts. This list is your authority to request/requisition them for replacement based on authorization of the end item by the TOE/MTOE. Illustrations are furnished to help you find and identify the items.

## B-3. EXPLANATION OF COLUMNS.

- a. Column (1), Illustration Number (Illus Number). This column gives you the number of the item illustrated.
- b. Column (2), National Stock Number. This column identifies national stock number of the item to be used for requisitioning purposes.
- c. Column (3), Description, CAGEC and Part Number. This column identifies the Federal item name (in all capital letters) followed by a minimum description when needed. The last line below the description is the Commercial and Government Entity Code (CAGEC) (in parentheses) and the part number.
- d. Column (4), Usable On Code. If item needed differs for different models of this equipment, the model is shown in this column.
- e. Column (5), Unit of Issue (U/I). This column indicates how the item is issued for the National Stock Number shown in column two.
- f. Column (6), Quantity Required (Qty Req). This column indicates the quantity required.

Section II. COMPONENT OF END ITEM (COEI)					
(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION, CAGE AND PART NUMBER	(4) USABLE ON CODE	(5) U/I	(6) QTY REQD
1		ADAPTER, RADIO POWER (0GXD3), 2412	FKY	EA	1
2		ADAPTER, P3 (34712), E28063	FKY	EA	3
3		ANCHORBOARD ASSY (34712), E20053	FKY	EA	1
4		ANTENNA (23657), 5240	FKY	EA	1
5		ANTENNA (96906), GFE-3	FKY	EA	1
6		CAB, OPERATOR (34712), E02873	FKY	EA	1
7		CHARGER, RADIO BATTERY (0HTU4), HTN9630	FKY	EA	1
8		COMPASS (50967), HB-85	FKY	EA	1
9		CLEAT, MOORING (34712), E07723	FKY	EA	16
10		CONNECTOR, FLEXOR (34712), E02783	FKY	EA	6
11		D-RING, MOORING (34712), E07803	FKY	EA	40
12		FENDER ASSY (34712), E03103	FKY	EA	16
13		HORN, RHINO (34712), E07733	FKY	EA	3
14		INTERCONNECT, MODULE ELECTRICAL (34712), E03003	FKY	EA	1
15		KIT, HYDRAULIC TEST (34712), E28943	FKY	EA	1
16		MANUAL, LUBRICATION ORDER LO55-1945-205-12	FKY	EA	1
17		MANUAL, OPERATOR TM55-1945-205-10	FKY	EA	1

Section II. COMPONENT OF END ITEM (COEI)					
(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION, CAGE AND PART NUMBER	(4) USABLE ON CODE	(5) U/I	(6) QTY REQD
18		MANUAL, REPAIR PARTS & SPECIAL TOOLS LIST TM55-1945-205-24P	FKY	EA	1
19		MANUAL, UNIT DS & GS MAINT TM55-1945-205-24-1, MCF	FKY	EA	1
20		MANUAL, UNIT DS & GS MAINT TM55-1945-205-24-2, DIESEL ENGINE	FKY	EA	1
21		MANUAL, UNIT DS & GS MAINT TM55-1945-205-24-3, MARINE GEAR	FKY	EA	1
22		MANUAL, UNIT DS & GS MAINT TM55-1945-205-24-4, TRANS CASE	FKY	EA	1
23		MAST ASSEMBLY, MAIN (34712), E03123	FKY	EA	1
24		MAST ASSEMBLY, STUB (34712), E18343	FKY	EA	1
25		MODULE, P25B BEACH END (34712), E02853	FKY	EA	3
26		MODULE, PROPULSION, P40P (34712), E28043	FKY	EA	2
27		PLENUM, EXHAUST (34712), E18263	FKY	EA	2
28		PLENUM, INTAKE (34712), E12183	FKY	EA	1
29		PONTOON, P20CR (34712), E02823	FKY	EA	7
30		PONTOON, P20LR (34712), E02833	FKY	EA	7
31		PONTOON, P20RR (34712), E02813	FKY	EA	7

Section II. COMPONENT OF END ITEM (COEI)					
(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION, CAGE AND PART NUMBER	(4) USABLE ON CODE	(5) U/I	(6) QTY REQD
32		PONTOON, P40 (34712), E02803	FKY	EA	10
33		RADIO (96906), GFE-1	FKY	EA	1
34		RAILING INSTALLATION (34712), E03136	FKY	EA	1
35		RECEIVER/TRANSMITTER (0HTU4), H5111	FKY	EA	1
36		RECEIVER/TRANSMITTER (0WF67), DSC 500	FKY	EA	1
37		REMOTE AND MICROPHONE (96906), GFE-2	FKY	EA	1
38		SPREADER ASSEMBLY (34712), E19883	FKY	EA	1

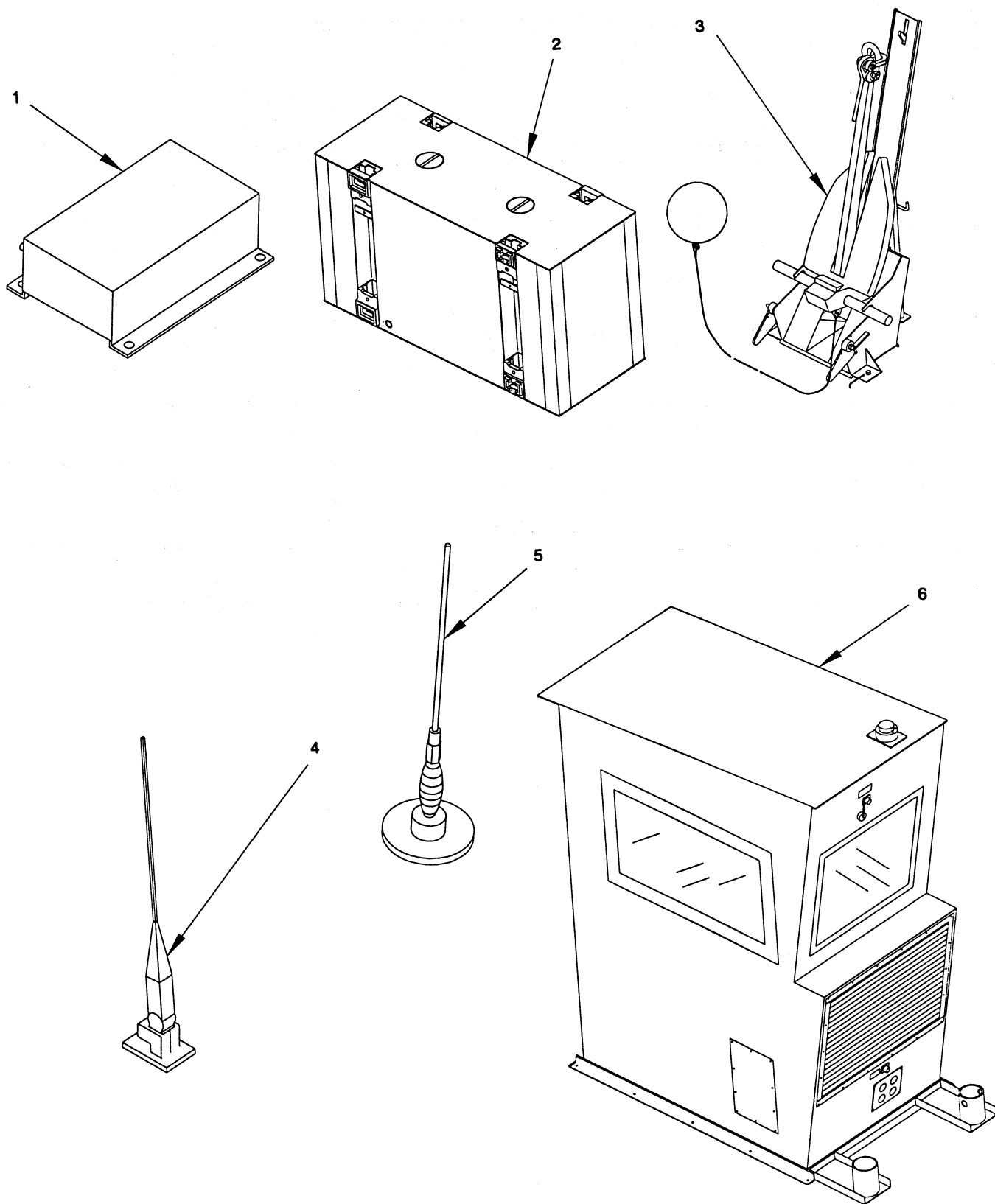


Figure B-1. Components of the End Item (COEI) (Sheet 1 of 5)

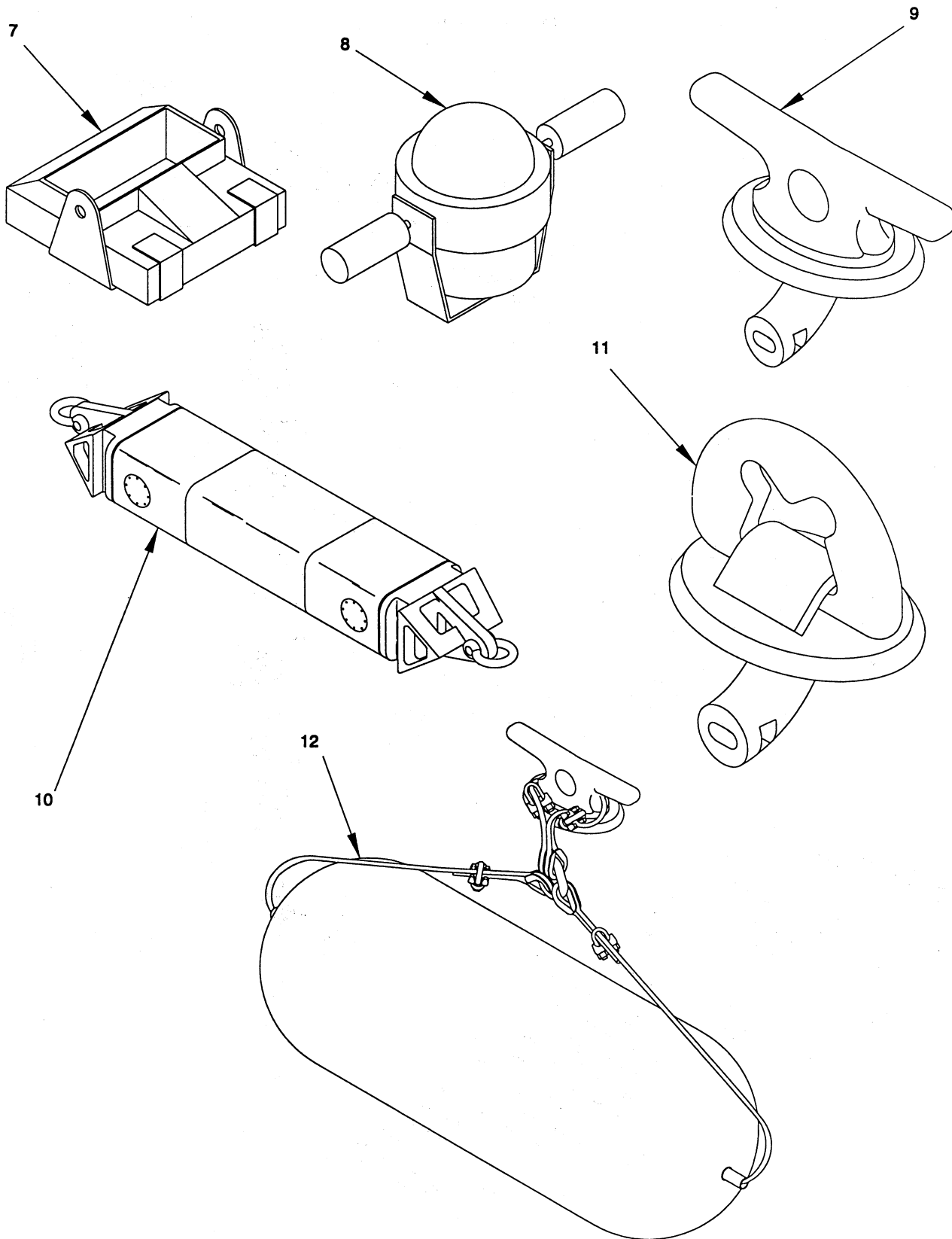


Figure B-1. Components of the End Item (COEI) (Sheet 2 of 5)

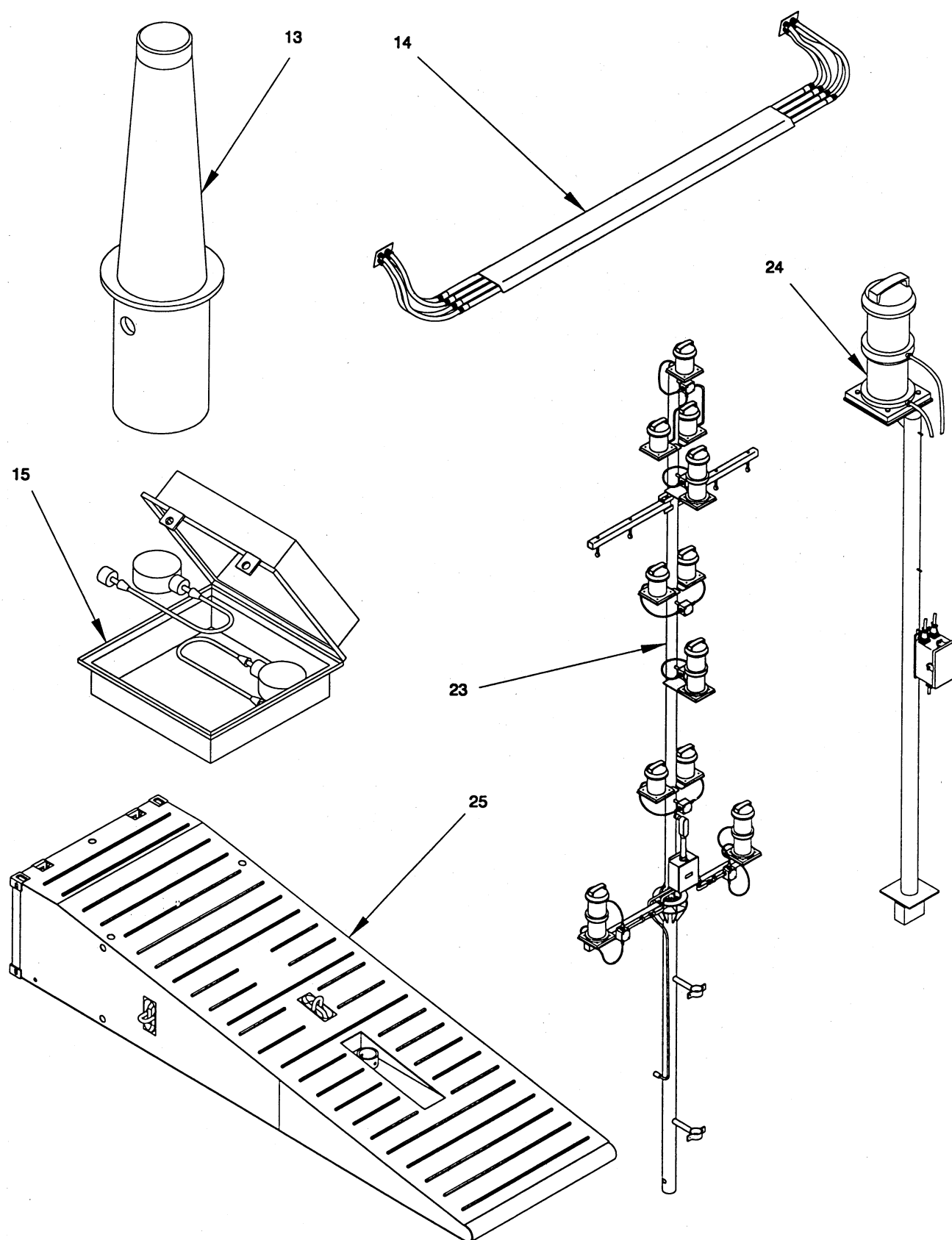


Figure B-1. Components of the End Item (COEI) (Sheet 3 of 5)

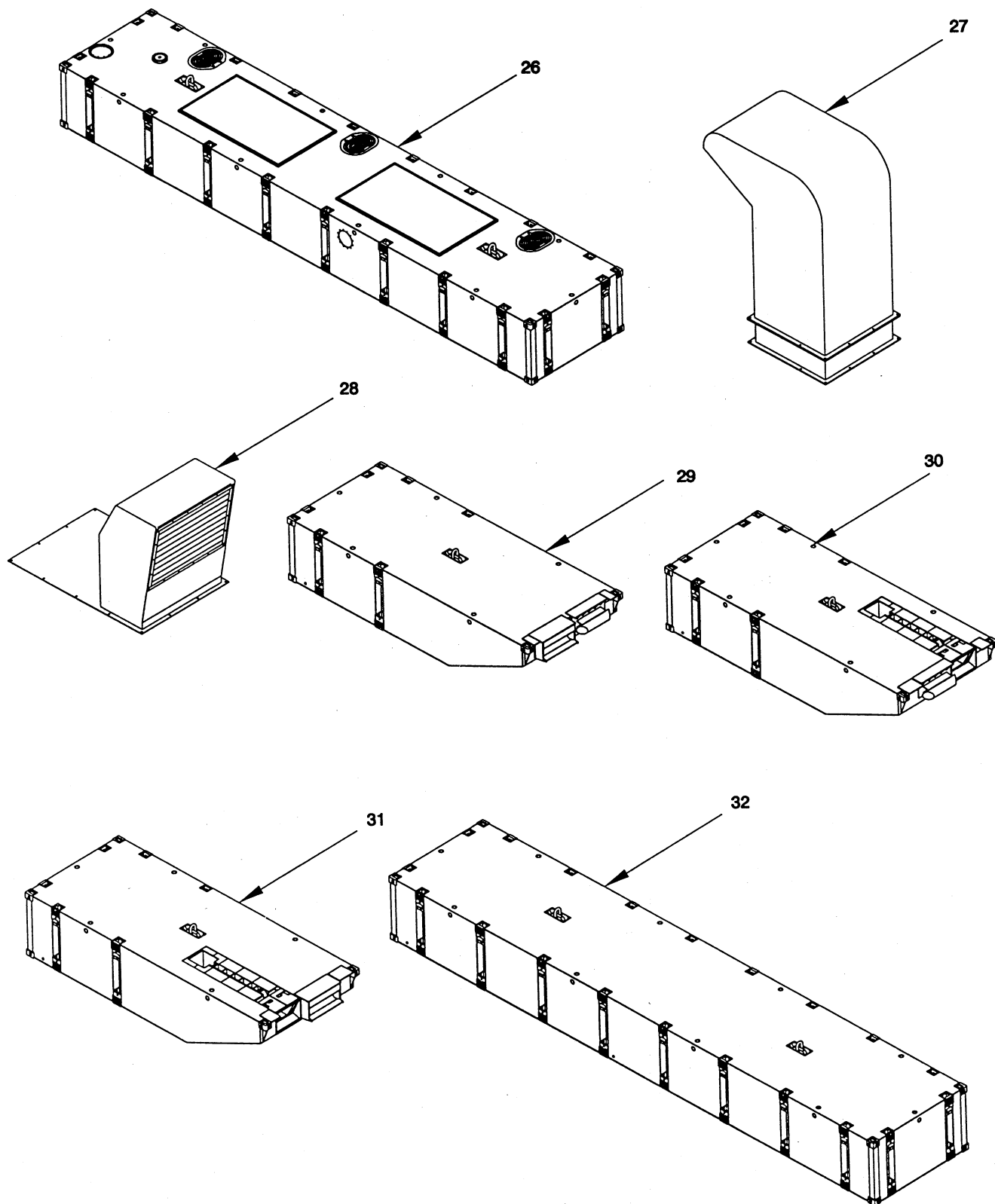


Figure B-1. Components of the End Item (COEI) (Sheet 4 of 5)

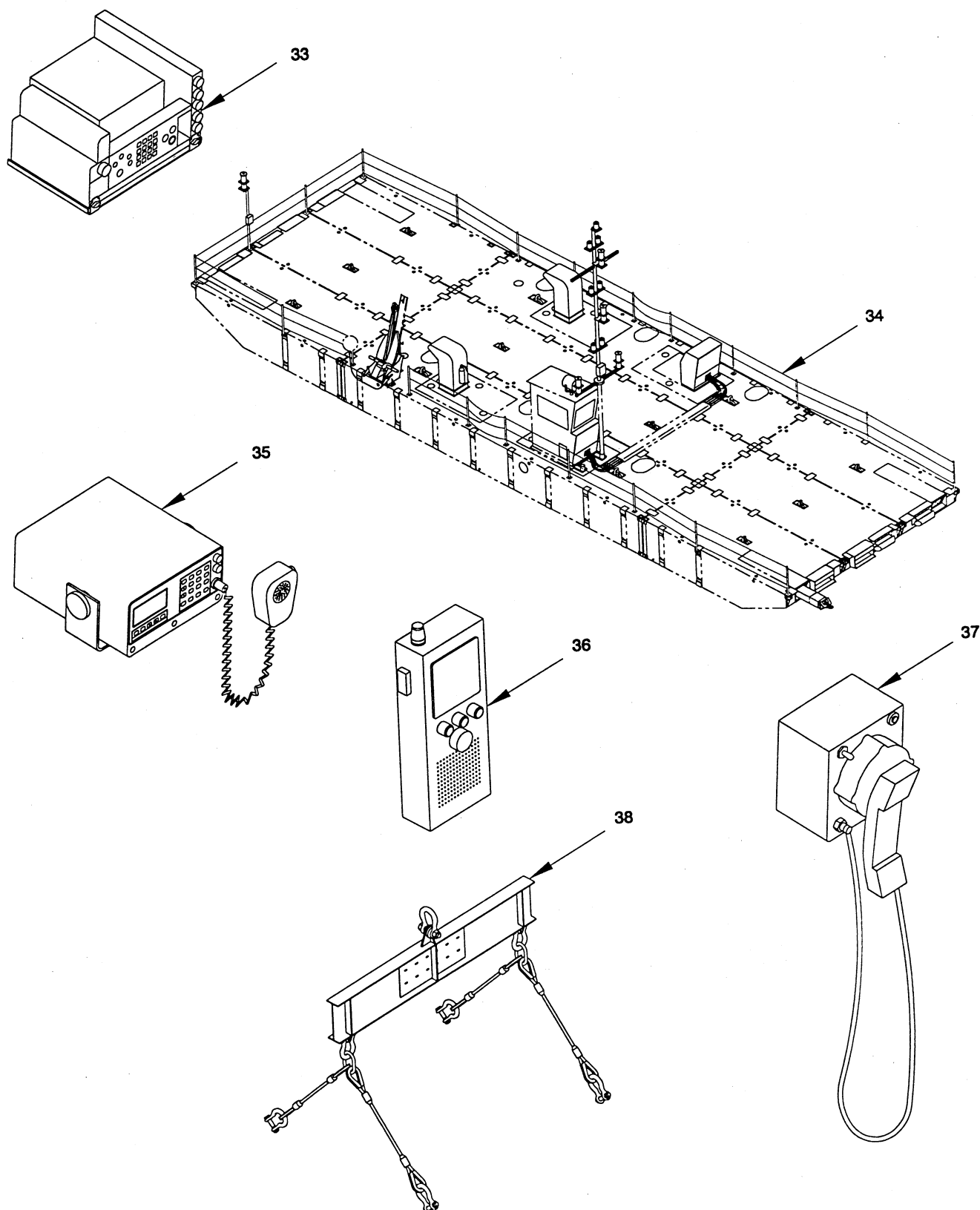


Figure B-1. Components of the End Item (COEI) (Sheet 5 of 5)

Section III. BASIC ISSUE ITEMS LIST (BIIL)					
(1) ITEM	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION , CAGE AND PART NUMBER	(4) USABLE ON CODES	(5) UM	(6) QTY RQD
1	8415-00-082-6108	Apron, Battery Service	FKY	EA	2
2	4210-00-142-4949	Ax, Fire (81348) GGG-A-926	FKY	EA	1
3	5120-00-242-0762	Bar, Wrecking, 36 In. Long (81348) GGG-B-101	FKY	EA	2
4	6135-00-643-1310	Battery, Nonrechargeable, 6V (Battle Lantern) (83740) EV90	FKY	EA	6
5	6135-00-930-0030	Battery, Flashlight, Size "D", Alkaline (80058) BA3030	FKY	BX	1
6	Local Purchase Item- Water-Jel AWK Fire Blanket, H&H Associates Inc., P.O. Box 4496, Alexandria, VA 22303, Phone 1- 800-326-5708	Blanket, Fire, 72" X 60"	FKY	EA	1
7	5340-00-275-4583	Clips, Halyard	FKY	BOX	2
8	Local Purchase Item- Lifesaving Systems Corp., 720 4th St. SW, Ruskin, FL 33570-1829, Phone 813-645-2768	Coverall, Antiexposure, Sterns Model 1FS-580, Orange (1 per crew member)	FKY	EA	6
9	5120-00-224-1390	Crowbar, Wedge Point, 60 In. Long	FKY	EA	2
10	Local Purchase Item- Water-Jel AWK Kit, H&H Associates, Inc. P.O.Box 4469, Alexandria, VA 22303 Phone 1-800-326-5708	Dressing, Burn, Kit (contains 2/8" X 18", 1/4" X 16", 4/4" X 4", 1/12" X 16" [Face Mask] dressings, and 1 package of Burn-Jel topical dressing	FKY	EA	1
11	4210-00-203-0217	Extinguisher, Fire, Portable, 15 lbs. CO <sub>2</sub> capacity (33525) 466182	FKY	EA	3
12	4220-00-542-2048	Faceshield, Safety (1 per crew member)	FKY	EA	6

Section III. BASIC ISSUE ITEMS LIST (BIIL)					
(1) ITEM	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION , CAGE AND PART NUMBER	(4) USABLE ON CODES	(5) UM	(6) QTY RQD
13		Fast Lube Oil Change System (FLOCS), Pump and Hoses	FKY	EA	1
14	5120-00-223-8921	Fid, 12 inch Wood	FKY	EA	2
15	8345-00-935-0445	Flag, Signal, "A" Intn'l Code, Size 6 (81349) MIL-F-2692	FKY	EA	1
16	8345-00-926-6803	Flag, Signal, "B" Intn'l Code, Size 6 (81349) MIL-F-2692	FKY	EA	1
17	8345-00-935-0451	Flag, Signal, "O" Intn'l Code, Size 6 (81349) MIL-F-2692	FKY	EA	1
18	8345-00-926-6814	Flag, Signal, "U" Intn'l Code, Size 6 (81349) MIL-F-2692	FKY	EA	1
19	8345-00-935-0455	Flag, Signal, "V" Intn'l Code, Size 6 (81349) MIL-F-2692	FKY	EA	1
20	8345-00-935-0456	Flag, Signal, "W" Intn'l Code, Size 6 (81349) MIL-F-2692	FKY	EA	1
21	8345-00-935-0457	Flag, Signal, "Y" Intn'l Code, Size 6 (81349) MIL-F-2692	FKY	EA	1
22	6230-00-264-8261	Flashlight, Watertight (81349) MIL-F-3747	FKY	EA	2
23	8415-00-266-8677	Gloves, Chemical Battery Service	FKY	PR	2
24	8415-01-267-9661	Gloves, Anti-Flash (1 pair per crew member) (81349) MIL-G-2874	FKY	PR	6
25	8415-00-634-4658	Gloves, Leather Palm ( 1 pair per crew member) (58536) A-A-50021	FKY	PR	6
26	8415-00-266-8691	Gloves, Electric (1 pair per crew member) (81348) ZZ-G-401	FKY	PR	6
27	4240-00-052-3776	Goggle, Clear Lens, Chipping (1 per crew member)	FKY	EA	6

Section III. BASIC ISSUE ITEMS LIST (BIIL)					
(1) ITEM	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION , CAGE AND PART NUMBER	(4) USABLE ON CODES	(5) UM	(6) QTY RQD
28	4240-00-190-6432	Goggle, Industrial, No Vents (Chemical Splash)(1 per engineer) (58536) A-A-110	FKY	EA	2
29	8465-01-004-2893	Goggle, Safety, Wind, Dust, Sand, Spray (1 per crew member) (81349) MIL-G-43914	FKY	EA	6
30	5120-00-243-2957	Hammer, Sledge, 10 lb	FKY	EA	2
31	8415-00-279-2205	Hard hat, Blue (58346) A-A-2269 Type 2 Class A Style A	FKY	EA	2
32	8415-00-823-7575	Hard hat, Brown (58346) A-A-2269 Type 2 Class A Style A	FKY	EA	4
33	4240-00-022-2522	Harness, Safety, Torso (80204) ANSI Z359.1	FKY	EA	6
34	2040-00-268-9250	Hook, Boat, 10 ft Handle (21530) H389	FKY	EA	2
35	Local Purchase Item GEN367C	Kit, Lockout/Tagout, Pig	FKY	EA	1
36	4730-00-542-3359	Kit, Pipe Repair, Emergency (81349) MIL-4-17882B	FKY	EA	1
37	6230-00-783-6519	Lantern, Battle, SYM 100.2, with red filter, Body Assembly (62025A),M16377/53-001	FKY	EA	1
38	6230-00-783-6519	Lantern, Battle, SYM 100.2, no filter, Body Assembly (62025A),M16377/53	FKY	EA	2
39	6230-00-776-5920	Lantern, Battle, SYM100.2, Handle and Switch	FKY	EA	3
40	4240-00-022-2518	Lanyard, Safety Harness (80204) ANSI Z359.1	FKY	EA	6
41	6260-01-086-8077	Light, Distress, Personnel Marker (83239) 2172-A-1	FKY	EA	24
42	4020-00-240-2161	Line, Halyard, Nylon, 1/4 inch x 300 ft	FKY	EA	1

Section III. BASIC ISSUE ITEMS LIST (BIIL)					
(1) ITEM	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION , CAGE AND PART NUMBER	(4) USABLE ON CODES	(5) UM	(6) QTY RQD
43	4020-01-344-0552	Line, Heaving, Safety, 100 ft (OGU87) NIS-G-0213	FKY	EA	2
44	4020-00-530-0698	Line, Retrieving, Ring Bouy (81349) MIL-R-24049	FKY	RL	1
45	5120-00-255-1476	Maul, Ship's, 5 lb. (Damage Control Plugs) (58536) A-A-1285	FKY	EA	1
46		Pneumatic Test Set-Up	FKY	EA	1
47	5510-00-260-8949	Plug, Soft Wood, 10" X 7" X 12" Long (80064) S8800-461043	FKY	EA	5
48	5510-00-260-8973	Plug, Soft Wood, 8" X 4" X 10" Long (80064) S88000-461043	FKY	EA	5
49	5510-00-260-8969	Plug, Soft Wood, 7" X 3" X 10" Long (80064) 803-461043	FKY	EA	5
50	5510-00-260-8953	Plug, Soft Wood, 1" X 0" X 3" Long (80064) 803-461043	FKY	EA	5
51	5510-00-260-8958	Plug, Soft Wood, 2" X 0" X 4" Long (80064) S8800-461043	FKY	EA	5
52	5510-00-260-8962	Plug, Soft Wood, 3" X 0" X 8" Long (80064) 803-461043	FKY	EA	5
53	4220-00-200-0538	Preserver, Life, Inherently Buoyant, Vest Type w/Collar (1 per crew member) (81349) MIL-L-18045	FKY	EA	8
54	4220-00-276-8926	Preserver, Life, Vest (1 per crew member) (81349) MIL-L-7653	FKY	EA	8
55	4240-00-022-2946	Protector, Aural, Sound (1 per crew member) (71483) E31C	FKY	EA	6
56		Pump, AOAP Sampling	FKY	EA	1

Section III. BASIC ISSUE ITEMS LIST (BIIL)					
(1) ITEM	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION , CAGE AND PART NUMBER	(4) USABLE ON CODES	(5) UM	(6) QTY RQD
57	8345-01-101-1101	Shape, Day Maritime, Diamond, Black, 2 ft. dia., 4 ft. Long (81349) MIL-S-29134	FKY	EA	1
58	8345-00-174-0453	Shape, Day Maritime, Ball, Black, 2 ft. dia., 4 ft. Long (81349) MIL-S-29108	FKY	EA	2
59	2090-00-058-3737	Shoring, Steel, Adjustable, Short, 3 ft. to 5 ft. (81349) MIL-S-23965	FKY	EA	4
60	1370-01-030-8330	Signal, Distress, Orange Smoke, Red Illumination (10001) DL3139734	FKY	EA	12
61	9390-01-078-8660	Tape, Retroreflective, 3" X 50 yds, Adhesive Backed (94960) 3150-3X50YD	FKY	RL	1
62	5180-00-629-9783	Tool Kit, Marine and Rail	FKY	EA	1
63	5510-00-268-3479	Wedge, Plug, Tapered, Hardwood, 2" X 2" X 8" Long (80064) S8800-461043	FKY	EA	5
64	5510-00-268-3475	Wedge, Shoring, Tapered, Hardwood, 1 1/2" X 2" X 12" Long (80064) S8800-461043	FKY	EA	5
65	8465-00-254-8803	Whistle, Plastic Ball w/Lanyard (58536) A-A-55106	FKY	EA	24

## APPENDIX C

## EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

## Section I. INTRODUCTION

## C-1 SCOPE.

Section II lists Expendable/Durable Supplies and Materials (EDSM) you will need to operate and maintain the Modular Causeway Ferry (MCF). These items are authorized to you by CTA 50-970, Expendable/Durable Items (Except Medical, Class V, Repair Parts, and Heraldic Items).

## C-2 EXPLANATION OF COLUMNS.

- a. Column 1 - Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Cleaning solvent P-D-680 (Appendix C, item 2)").
- b. Column 2 - Level. This column identifies the lowest level of maintenance that requires the listed item. The symbol designations are as follows:
  - C Operator or crew
  - O Unit Level maintenance
  - F Direct Support
  - H General Support
- c. Column 3 - National Stock Number. This column indicates the National stock number assigned to the item. Use it to request or requisition the item.
- d. Column 4 - Description CAGE and Ref Number. This column indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the Commercial and Government Entity (CAGE) code in parentheses followed by the part number.
- e. Column 5 - Unit of Measure (U/M). This column indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST				
(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
1	O	8030-01-126-9460	Adhesive (05972) #222, MIL-S-46163A, Type II, Grade M	EA
2	O	8040-01-250-3969	Adhesive (05972) #242, MIL-S-46163A, Type II, Grade N	EA
3	O	8040-00-092-2816	Adhesive, Epoxy (12405) EPS-608	EA
4	O	8040-01-194-0391	Adhesive, Silicone (71984) RTV-732	EA
5	O	6850-00-181-7929 6850-00-181-7933	Antifreeze, Ethylene Glycol, (81349) ASTM-D4985 1 gallon container 5 gallon container	GL GL
6	O	7920-01-088-5188	Brush, Soft Bristle (53800 ) 30G14493	EA
7	O	7920-00-044-9281	Cloth, Cleaning (81349) MIL-C-85043	LB
8	O	7920-00-292-9204	Cloth, Cleaning, extra heavy (80244) A-A-162, Type 1, Class 2	MX
9	C	8030-00-209-8005	Compound, Antiseize (81348) TT-S-1732 (M22361)	OZ
10	C, O	6850-00-926-2275	Compound, Cleaning, windshield washer, 1 pint (81348) O-C-1901	PT
11	C		Compound, Rust Preventative (81349), MIL-C-16173, Grade 2	
12	O		Compound, Sealing (05972) 598	EA
13	O	8030-01-009-2590	Compound, Sealing (08854) 42029	CN
14	C		Compound, Silicone (81349), MIL-C-21567 or commercial equivalent	EA
15	O	5970-00-241-5406	Compound, Thermal Joint (05820) 120-8	OZ
16	O	7930-00-282-9699	Detergent, General Purpose, 1 gallon (80244) MIL-D-16791 Type I	GL

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST				
(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
17	O	6810-00-236-0702 6810-00-904-9372	Electrolyte, Acid, Sulfuric (81348) O-S-801 Class III 1 gallon 5 gallons	GL GL
18	O	9150-00-993-6621	Fluid, Hydraulic, Mobil DTE 25 (19135) 60263-1	GL
19	C	9150-00-145-0268	Grease, Aircraft (81349) MIL-G-81322	CN
20	O	9150-00-985-7246	Grease, Aircraft and Instrument (81349) MIL-G-23827	LB
21	F		Grease, lithium (73219) GR-132	TU
22	C, O	9150-00-929-7946	Grease, Lubriplate (73219) 1200-2	TU
23	O		Grease, Mobilux Grade No 2 or equivalent E.P. Grease, NLGI grade 2 (19135) 64127-4	TU
24	F	9150-01-080-9652	Grease, Silicone (81349) MIL-L-15719	EA
25	O	9150-00-530-6814	Grease, Wire Rope, (81349) MIL-G-18458	CN
26	C	6850-00-003-5295	Lubricant, Compound, Cleaning (81349) MIL-C-83360	CN
27	C		Oil, Light Lubricating, General Purpose (81348) VV-L-820	PT
28	C, O	9150-01-035-5393	Oil, Lubricating, Gear	CN
29	O		Oil, Mobilgear 626 (19135) 61085-7	QT
30	O		Oil, Mobilgear 629 (19135) 61086-5	QT
31	O	9150-00-261-7899	Oil, Penetrating (81348) VV-P-216	EA
32	O		Oil, SAE Grade 30, Mobil Delvac 1230 (if operating below 0° F.) (19135) 44067-7	PT

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST				
(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
33	O	9150-01-219-3276	Oil, SAE Grade 50, Mobil Delvac 1250 (if operating above 0° F.) (19135) 44097-4	PT
34	O		Oil, SAE 40, API Class CD-II,, Sulfated Ash less than 1.0%, Mobil Delvac 1340, MIL-L-2104D (19135) 44073-5	QT
35	C		Paint, Amercoat 385 PA Oxide Red Primer (09869) 373-930	GL
36	C		Paint, Amercoat 385 #27 Haze Grey (09869) 353-070	GL
37	C		Paint, Amercoat 385 AS Mid Graphite Grey (09869) 372-130	GL
38	C		Paint, Amercoat 385 Black (09869) 994-086	GL
39	C		Paint, Enamel, Yellow (17833) TTE-490	GL
40	C		Paint, Primer, Red Oxide (17833) TTP-664, #13538	GL
41	C, O	8030-00-204-9149	Sealant, Pipe Thread, 50 ML Tube, (05972) #592	EA
42	O		Sealant, RTV Silicone, Tube (4M493) #6BC	EA
43	O	8030-00-339-0310	Sealant, Thread, 50 ml bottle (05972) 56931	EA
44	O		Sleeve, Solder (63590) LSSS-300	EA
45	O	6505-00-055-9422	Soda, Baking (Sodium Bicarbonate) (60060) NDC00074-4103-03	OZ
46	O	6850-00-664-5685 6850-00-264-9038 6850-00-274-5421 6850-00-285-8011	Solvent, dry cleaning P-D-680 Type II (58536) A-A-71 1 quart container 1 gallon can 5 gallon drum 55 gallon drum	QT GL GL GL

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST				
(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
47	O	8030-00-889-3535	Tape, Teflon, ½ In (81348) MIL-T-27730	RL
48	C		Thinner, Paint, Amercoat #65 or equivalent 09869 100-120	GL
49	O	5970-01-124-7344	Tubing, Heat Shrink (06090) MIL-LT-1/4	FT
50	O	5970-01-124-8565	Tubing, Heat Shrink (06090) MIL-LT-3/8	FT
51	O		Tubing, Heat Shrink (06090) MIL-LT-1/2	FT
52	O	5970-01-101-7407	Tubing, Heat Shrink (75037) EPS-200 1-1/2	FT
53	O		Tubing, Heat Shrink (75037) EPS-200 2	FT
54	C	6810-00-297-9540	Water, Distilled, 5 gallons (96906) MS36300-5	GL
55	O	9330-01-250-2958	Wrap, Spiral (06383) T50N	EA
56	O	9330-01-311-3859	Wrap, Spiral (06383) T25N	EA
57	O	E24628-3	Wrap, Tie, Nylon, .140 X 11.10 (56501) TY526MX	Bdl
58	H	8010-01-349-8055 8010-01-380-3306	Zinc, Inorganic, No. 531 0N4K0 (IC531) 4 Gallon Package 1 Gallon Package	GL



**APPENDIX D**

**MANUFACTURED ITEMS LIST (MIL)**

There are no parts authorized for manufacture.



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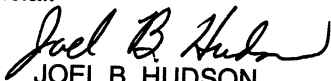
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PFC John DOE  
CO A 3rd Engineer Bn  
Ft. Leonardwood, MO 63108

DATE SENT

22 August 1992

PUBLICATION NUMBER

TM 1-1520-250-10

PUBLICATION DATE

15 June 1992

PUBLICATION TITLE

Operator's manual MH60K Helicopter

BE EXACT PIN-POINT WHERE IT IS

IN THIS SPACE, TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO
6	2-1 a		
B1		4-3	

In line 6 of paragraph 2-1a the manual states the engine has 6 cylinders. The engine on my set only has 4 cylinders. Change the manual to show 4 cylinders.

Callout 16 in figure 4-3 is pointed at a bolt. In key to figure 4-3, item 16 is called a shim. Please correct one or the other

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

JOHN DOE, PFC (268) 317-7111

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JOHN DOE

*John Doe*

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GRAPH

FIGURE  
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PUBLICATION TITLE

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PAGE  
NO

PARA-  
GRAPH

FIGURE  
NO

TABLE  
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TEAR ALONG PERFORATED LINE





# The Metric System and Equivalents

## Linear Measure

1 centimeter = 10 millimeters = .39 inch  
 1 decimeter = 10 centimeters = 3.94 inches  
 1 meter = 10 decimeters = 39.37 inches  
 1 dekameter = 10 meters = 32.8 feet  
 1 hectometer = 10 dekameters = 328.08 feet  
 1 kilometer = 10 hectometers = 3,280.8 feet

## Weights

1 centigram = 10 milligrams = .15 grain  
 1 decigram = 10 centigrams = 1.54 grains  
 1 gram = 10 decigrams = .035 ounce  
 1 dekagram = 10 grams = .35 ounce  
 1 hectogram = 10 dekagrams = 3.52 ounces  
 1 kilogram = 10 hectograms = 2.2 pounds  
 1 quintal = 100 kilograms = 220.46 pounds  
 1 metric ton = 10 quintals = 1.1 short tons

## Liquid Measure

1 centiliter = 10 milliliters = .34 fl. ounce  
 1 deciliter = 10 centiliters = 3.38 fl. ounces  
 1 liter = 10 deciliters = 33.81 fl. ounces  
 1 dekaliter = 10 liters = 2.64 gallons  
 1 hectoliter = 10 dekaliters = 26.42 gallons  
 1 kiloliter = 10 hectoliters = 264.18 gallons

## Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch  
 1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches  
 1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet  
 1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet  
 1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres  
 1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

## Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch  
 1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches  
 1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

# Approximate Conversion Factors

To change	To	Multiply by	To change	To	Multiply by
inches	centimeters	2.540	ounce-inches	newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29.573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	newton-meters	1.356	metric tons	short tons	1.102
pound-inches	newton-meters	.11296			

# Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C
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**PIN: 075697-000**